GEOGRAPHICAL BULLETIN

No. 5 1954

GEOGRAPHICAL BRANCH
Department of Mines and Technical Surveys
OTTAWA, CANADA

GEOGRAPHICAL BULLETIN

Address all correspondence to the Director, Geographical Branch, Department of Mines and Technical Surveys, Elgin Building, Ottawa, Canada. *Geographical Bulletin* will be mailed, post-paid, for 50 cents a copy.

CONTENTS

PAGE

Preface.. v

A Vegetation Map of the Carter Basin Area, Lake Melville Lowlands, Newfoundland........................ By Pierre Gadbois and I. A. McKay 1

Geographical Relationships of Types of Shipping in British Columbia Coastal Waters.................................. By Brooke Cornwall 4

A Reconnaissance Survey of the Saddle Lake District, Alberta.... By W. M. Baker 14

The Corner Brook Area, Newfoundland................ By W. C. Wonders 29

Land Classification as part of a Geographical Survey of the Avalon Peninsula of Newfoundland........................... By Lloyd G. Reeds 59

Geographical notes

Map notes.. 79

Book notes.. 79

PREFACE

The articles in this number of the Bulletin, based on field work, deal with parts of the economic frontier in Canada or with its penetration from established centres. They range from the Atlantic to the Pacific and touch upon the northern Prairies. They show that the Canadian frontier lies not only in the newer sections but also in the older regions of the country. The frontier is not a matter of time, but of the use of resources, of the mastery of the land, and of the organization of settlement.

The survey of the Avalon Peninsula indicates, in certain localities, a sort of continuing fixation of pioneer conditions. Here many amenities are still to be developed and much yet to be achieved. The severity of the environment has, undoubtedly, much to do with the situation. What is of nterest, however, is that where a site is developed successfully for its seaward connections, it not only makes use of its immediate hinterland but begins to compete with other settlements for the use of available forest and agricultural resources. It would seem, therefore, that certain more favoured ocalities, developed in conjunction with a more concentrated, centralized and specialized fishing industry and, thus, with better trading facilities, could support more people at a higher standard of living, possibly as a result of a regrouping of the population from its present scattered and somewhat neffectual distribution.

In this connection the transformation at Corner Brook is significant. Here the activities of a wide area are concentrated, and instead of producng many small mill settlements, with poor amenities, they are evolving a centralized settlement that is, in turn, reorienting and co-ordinating others about it, and beginning to offer favourable conditions and valuable services. The particular problems faced in this process are considerable. In effect hey mean a reinterpretation of the geography of settlement in terms of new economic and social ideas, with a movement forward to a mature cultural landscape.

The articles in this number also show that pioneer development need not be thought of in terms of remote farming areas (such as Saddle Lake) only, but may also affect metropoli such as Vancouver. This is a reflection of the extent to which the pioneering process is being developed from our great cities by essentially urban, mechanized, and commercialized techniques. There may in many cases be no "twilight" zone of small towns and villages: the jump may be complete from the great city to the wilderness. As a result, centres like Vancouver, Edmonton, Winnipeg, Toronto, Montreal, and St. John's directly promote, and feel the direct effects of, the pioneer endeavour. It is not surprising to find, therefore, nearly half of the entire population of British Columbia concentrated in Vancouver.

Examining what happens "at the end of the line", in the pioneer zone itself, we find that there, as in northern Alberta, the "homesteading" type of pioneering is virtually at an end. Its place has been taken by farming methods that require large-scale mechanized production, relying on good transportation, a well-developed business machine, and a cash economy.

As a result, it might be noticed, the extension of the frontier—even of the agricultural frontier—does not mean a correspondingly great expansion of the population. Modern methods, requiring more acres per man and developing very much more product per capita, allow a considerable increase both in occupied area and in total yield for a relatively small addition in settlement. The same is true for lumbering and mining. Indeed, possibly more men are needed at the centre than at the periphery, to keep the economic frontier expanding. This will have an increasingly important bearing on immigration and development.

That the frontier is growing, however, is evident. The reasons for this are not set forth in the following articles. Yet they might be deduced from them. For the reorientation and concentration of population in Newfoundland, the deep penetration of development outwards from Vancouver into pioneer British Columbia, and the consolidation of settlement in northern Alberta, all reflect the quickening and strengthening of our economy in relation to the total needs of the continent.

This undoubtedly springs from the changing situation in the United States. That country is still self-sufficient or largely so in many of its requirements but in others it is increasingly dependent upon imports. It is now the world's largest importer of copper, lead, and zinc, and also imports considerable quantities of petroleum, iron ore, and many other minerals and goods.

It is inevitable that, in looking abroad, the United States should look to Canada, its nearest neighbour. All along the Canadian pioneer fringe are resources that, if they could move in increasing quantities to North American industry, would strengthen the whole hemisphere. Some of these resources, like power, forests, and agriculture, can continue in perpetuity if proper conservation procedures are followed, so that Canada may continue indefinitely her contributions to western prosperity. Some, of course, like minerals, are wasting assets. But here, too, conservation and improved techniques of both extraction and use will greatly extend heir life. In any event, Canadian supplies are so large that they should ast for a very long time—at least until new developments render us all ess dependent on such materials.

It is for these reasons, then, that the growth of the Canadian frontier s so significant. It has a geographical connotation far surpassing the frontier belt itself, changing, as it does, the geography of the country as a whole and, more than that, fitting into and playing its part in the changing geography of the continent.

J. WREFORD WATSON,
Director, Geographical Branch

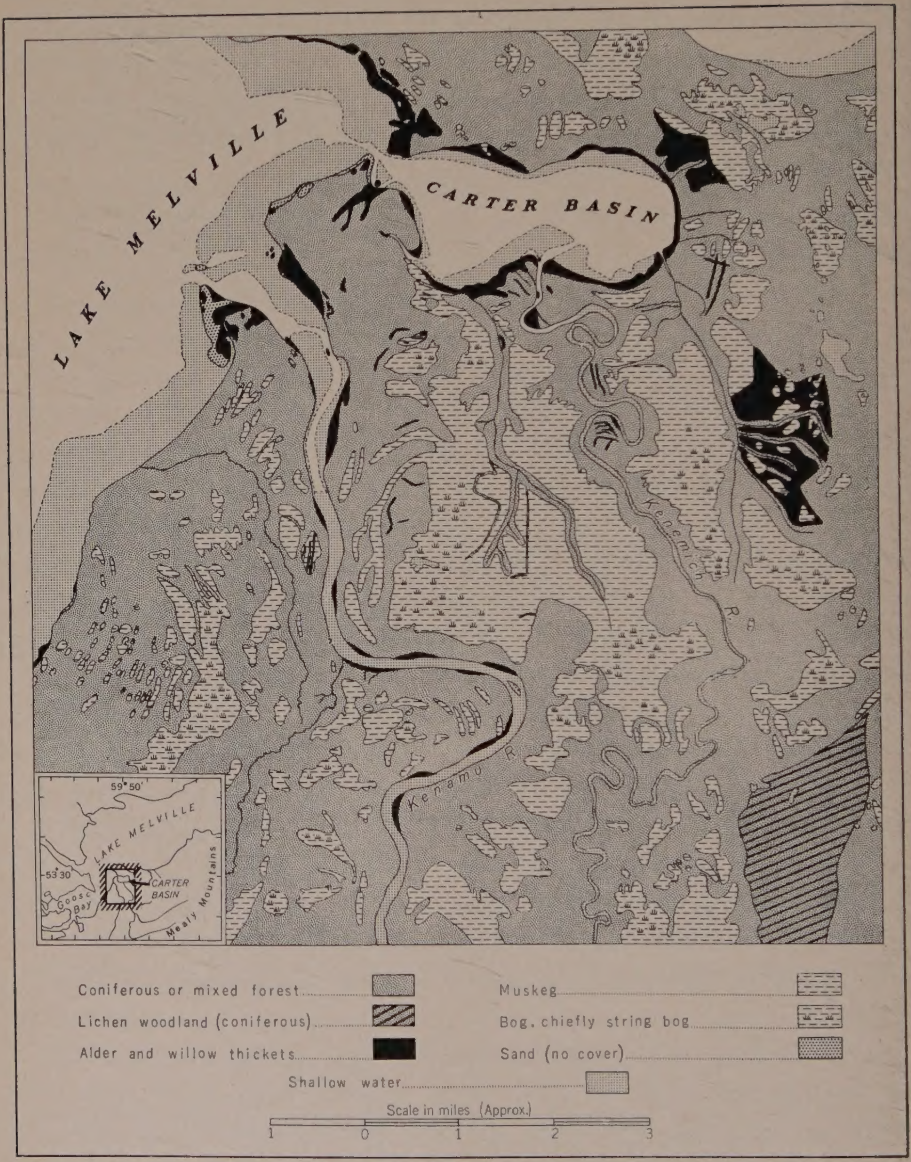

Figure 1. Vegetation types in the Carter Basin area of the Lake Melville Lowlands.

A VEGETATION MAP OF THE CARTER BASIN AREA, LAKE MELVILLE LOWLANDS, NEWFOUNDLAND

Pierre Gadbois and I. A. McKay[1]

The map accompanying this note shows the natural vegetation of a small area near the mouths of Kenamu and Kenamich Rivers, on the south shore of Lake Melville. The map, drawn from aerial photographs supplemented by field observations, illustrates very clearly the characteristic complex of vegetation types typical of low-lying flood-plain and terrace lands in this part of Labrador. As the inset map suggests, the sheer, rocky slopes of the Mealy Mountains begin a few miles south of the map-area, but the latter contains only the alluvial and sandy terrace or beach deposits of greater Lake Melville, whose successively lower shorelines feature the area shown.

The vegetation types fall naturally into a moisture-controlled series first described by Hustich[2] and later used by Hare[3] as the basis for a mapping program extending across the peninsula of Labrador-Ungava.

The Wet Series of Hustich is characteristic of badly drained or floodable ground. It comprises a number of types, ranging from open bogs with extensive open water on the one extreme to a rich swamp forest on the other. On the map there are three distinct types that belong to this series:

(i) *String-bogs*, consisting essentially of shallow pools of open water studded with "strings" or irregular masses of half-floating, half-stabilized vegetation. Sphagnum moss constitutes much of this cover, and considerable thicknesses of sphagnum peat probably underlie these bogs. The surface is yielding, and is impassable unless frozen. This type occurs on flat or gently sloping terraces and flood-plains.

(ii) *Muskeg*, which is wet ground covered with a stunted, open stand of black spruce, *Picea mariana* (Mill.) B.S.P., or tamarack, *Larix laricina* (Du Roi) K. Koch, set in a floor luxuriantly clothed with sphagnum and numerous moisture-tolerant shrubs. Many boggy openings occur, and the density of trees is on the whole low. Very large areas of muskeg occur on the flat terraces around Lake Melville.

(iii) *Alder and Willow Thickets*, which fringe most of the streams and lakes of the district, rendering especially difficult attempts to land from a canoe.

---

[1] Pierre Gadbois, B.A., M.A., Univ. of Montreal, and I. A. McKay, B.A., McGill Univ., were members of a Geographical Branch party, led by Mr. Gadbois, which carried out a short survey in the Carter Basin area during the summer of 1950.

[2] Hustich, I.: On the Forest Geography of the Labrador Peninsula: A Preliminary Synthesis; Acta Geographica, vol. 10, No. 2, 1949, especially pp. 36–42.

[3] Hare, F. K.: Climate and Zonal Divisions of the Boreal Forest Formation in Eastern Canada; Geog. Rev., vol. XL, No. 4, 1950, pp. 615–635.

GEOGRAPHICAL RELATIONSHIPS OF TYPES OF SHIPPING IN BRITISH COLUMBIA COASTAL WATERS

Brooke Cornwall[1]

In 1951, 51 per cent of the total number of ships in all Canadian coastal service entered the ports of British Columbia. In the same year the percentage of ships entering these ports made up of tugs and "unrigged" vessels[2] amounted to more than 85 per cent of the Canadian total. Fishing vessels of all kinds entering the ports also show a high total figure for 1951, amounting to 46 per cent of the number of vessels entering all Canadian ports[3]. The best appreciation of these shipping figures is obtained when they are considered in the light of the geography of the area, for not only do they reflect the physical geography of the British Columbia coast but also the types of resources found in the area and the methods used to move them from production areas to factories and mills. It is the purpose of this paper to draw attention to these relationships in order to understand more fully the intimate part that shipping plays in the economy of British Columbia and the west coast of Canada.

PHYSICAL SETTING

The entire British Columbia coast from the International Boundary to the Alaska Panhandle is backed by the Coast Mountains, with general elevations of 6,000 to 7,000 feet and some peaks of 10,000 feet. With the exception of the valleys of Fraser and Skeena Rivers, this mountain area is virtually impassable from the landward side. From the sea, however, there are many entrants formed by long, deep fiords cut into the mountainous coast. These fiords are submerged tributary valleys, overdeepened by Pleistocene glaciation, that lead inland from the Pacific Coastal Trough, a structural depression separating Vancouver Island and the Queen Charlotte Islands from the mainland. In addition to the two main island groups, the coast is fringed by a large number of small islands. These islands and the fiords of the mainland coast afford many hundreds of miles of protected waterways and countless refuges from strong winds and Pacific storms.

These storms, generally from a southeasterly direction and most common from October to April, occur at the time of the eastward movement of mid-latitude depressions that are an outstanding characteristic of the climate of coastal British Columbia. Also characteristic of this climate, the Marine West Coast Type, are generally mild temperatures. The average mean temperature for the year is between 48°F. and 50°F., varying from 36°F. in January and 57°F. to 58°F. in July and August. The annual precipitation reaches a maximum during the winter half of the year and varies from 60 inches in the south to 120 inches in the north.

---

[1] Brooke Cornwall, B.A., M.A., British Columbia, Geographer, Geographical Branch, Department of Mines and Technical Surveys, carried on a field investigation of the major ports of British Columbia during the summer of 1950.

[2] "Unrigged" vessels are scows and barges that depend for their movement on a tug.

[3] Canada, Department of Trade and Commerce, Dominion Bureau of Statistics: Shipping Report, year ended December 31, 1951.

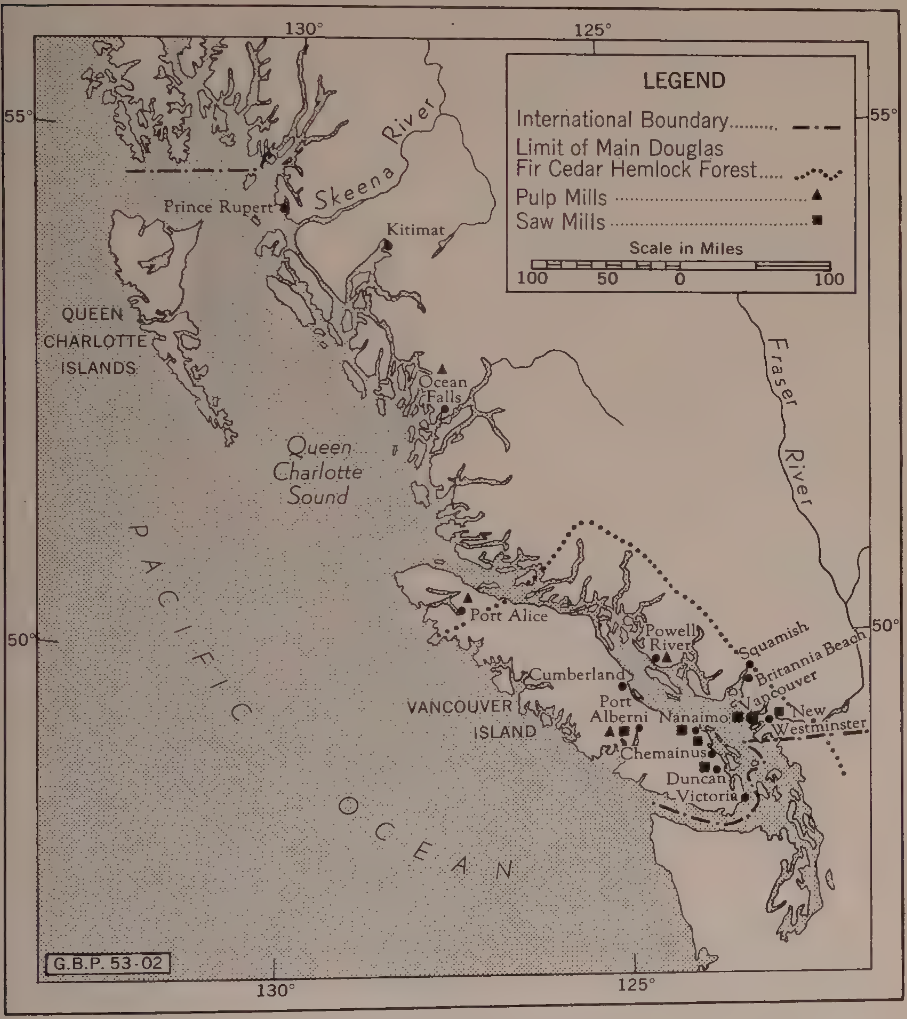

Figure 1. Location map.

FOREST RESOURCES

Mild temperatures and sufficient precipitation throughout the year have combined with the rugged nature of the westward facing slopes of the Coast Mountains and the lower mountains of Vancouver Island and the Queen Charlotte Islands to provide an ideal environment for one of the greatest coniferous forests of the world. The Douglas fir *(Pseudotsuga* *taxifolia)* is the principal species found on the lower, more accessible slop in the area south of Knight Inlet, whereas at higher elevations and latitud where precipitation is heavier, a mixed growth of western red cedar *(Thu plicata)*, western hemlock *(Tsuga heterophylla)*, and Sitka spruce *(Pic sitchensis)* is typical. In the extreme northern part of the area, increas latitude has the effect of reducing the elevation at which these species a found, and here western hemlock is the most common commercial type. the Queen Charlotte Islands, Sitka spruce is virtually the only species use

In the coastal area, Douglas fir, cedar, and spruce are the princip species used for lumber; hemlock and some spruce are used mainly f pulp. With the exception of Ocean Falls, a pulp and paper centre locat in the predominantly hemlock area, and the Queen Charlotte Islan which produce primarily spruce logs for southern mills, the main pulp a paper and lumber mill area is in the southern part of the coastal fores Within this area, lying generally south of Knight Inlet, there is no defin distribution pattern of pulp and paper or lumber centres. Some sett ments such as Port Alberni and Duncan produce both commodities, where others such as Chemainus, Powell River, New Westminster, or Vancouv produce only one (Figure 1).

FISHING

Fishing is the second major activity based on local natural resourc The main fishing grounds are the inshore waters around Vancouver Isla and the more open waters extending north to the Queen Charlotte Islan In some cases, fishing occurs as far away as the Aleutian Islands and much as 200 miles offshore.

In the southern inshore waters, herring, cod, and several varieties salmon, most notably cohoe, spring, and sockeye, are the principal spec caught. Farther north and in the more open waters the most importa species are halibut and tuna.

MINING

Coal, copper, iron ore, sand, and gravel are the main minerals produc in coastal British Columbia. The Comox-Cumberland area of Vancouv Island is the principal coal mining area of the coast. The coal here is soft variety used principally for the manufacture of coal gas at Victo and Vancouver. Britannia Beach on Howe Sound is the centre of produ tion of copper and zinc in coastal British Columbia. Iron ore is obtain from Quinsam Lake and Texada Island. Sand and gravel taken from ve extensive glacial deposits are found in many places along the coast, main producing areas, however, being in Howe Sound near Vancouv on Fraser River near New Westminster, and on the coast of Vancouv Island 6 miles northwest of Victoria.

Aluminum Company of Canada's project at Kitimat is a coastal area enterprise in the making. Now being developed toward production, this project will eventually have an output of upwards of 500,000 metric tons of aluminium a year, all of which will be produced from imported ore.

COMMUNICATIONS

The resources of coastal British Columbia are thus distributed over a wide area that for the most part is extremely rugged and that, in the main, is accessible only from the sea. In addition, this entire area is largely dependent on the Vancouver-New Westminster region in the southwest for all its supplies, mechanical equipment, labour, industrial processing, and deep-sea shipping. Because of this dependence by a widespread coastal area on cities in the extreme south, shipping of various kinds is essential to the economic life of the area.

Many of the vessels used, such as fishing boats, coastal steamers, and special petroleum carriers, are very important in the total picture of coastal shipping, but they are found in similar forms in other parts of Canada, and, indeed, are common to many other places in the world. Other types of vessels and means of transportation, such as scows, barges, tugs, log rafts, and log booms, however, are unique to British Columbia either because of their construction and uses or because of their large numbers.

The lumber industry in British Columbia has probably given rise to more specialized forms of shipping than has any other. Its products are largely transported by water, either as log rafts or in scows.

For the movement of logs to sawmills, where sheltered, enclosed waterways are used, a flat raft or "boom" is the usual method of transportation. These flat rafts are held together by an outside framework of joined logs and may measure up to 50 or 60 sections in length, each section being 50 feet long and containing 40,000 feet of lumber. If the route is such that the open sea must be traversed at any point, such "booms" cannot be safely used, as the swell of the waves allows logs to escape under the boom logs. In such cases a Davis raft is used. This consists of a huge cylinder, tapered at the ends, and composed of logs lying longitudinally and firmly bound together by chains and cables. Davis rafts may contain as much as 1,000,000 board feet of timber, and may draw as much as 20 feet of water. Both types of raft are towed by a tug—a type of vessel that varies from 30 feet in length, with 165 horsepower, to 135 feet with approximately 1,400 horsepower. The most common type is 60 feet long with between 300 and 400 horsepower, the criterion for size and power being the necessity to tow economically 35 sections of logs or two loaded scows.

Scows are rectangular, wooden, shallow-draft, bulk cargo carriers, varying in size from 30 by 90 feet with a capacity of 375 tons to 36 by 100 feet with a capacity of 600 tons. A principal use of scows is the movement of pulp and paper from such coastal producing centres as Ocean Falls and Powell River. Increasing amounts of pulp and paper are exported directly to world markets from these two centres. The remainder is moved to Vancouver, most commonly by scow, and as they are perishable commodities, a covered type is used. On the return trip these scows carry supplies and equipment for the settlements. Open-type scows are used extensively for the movement of non-perishable cargoes such as coal, sand and gravel, and "hog-fuel"[1].

The other major use of scows is for the movement of petroleum products. The movement of petroleum throughout the world has given rise to various specialized forms of transportation, and on the British Columbia coast scows have been specially adapted for the purpose. For delivery of petroleum products to distant coastal points, small tank ships similar to those in world-wide use are most commonly used, but for the large number of scheduled trips to points relatively near the refineries in Vancouver special steel tank scows have been built, with capacities varying from 1,000 to 5,000 barrels.

Barges are an additional form of unrigged shipping used in British Columbia. These are old schooners or other sailing vessels converted for use as bulk cargo carriers. Usually decks, masts, and rigging are removed to gain all possible hold space and to facilitate loading. Thus these vessels, towed by tugs, should not be confused with the barges so common to European rivers and canals. In British Columbia they are used for a variety of cargoes such as hog-fuel, pulpwood, pulp, and paper, and, by some companies, for logs. They are an economical method of transportation but require a greater depth of water than a flat boom of logs, or scows, and their fairly high centre of gravity makes them less seaworthy than the rectangular scows more commonly used.

The fishing industry has also been responsible for the development of specialized types of vessels. The largest are seiners, common to the entire Pacific coast from southern California to Alaska. These fishing vessels vary from 45 to 70 feet in length and are used principally in the inshore fisheries. Two smaller types are the salmon trollers, boats of between 35 and 45 feet, and the smaller gill netters that are between 30 and 40 feet in length. These types are used mainly for salmon fishing, and during the season they work slowly down the coast towards Fraser River for the final phase of the sockeye salmon fishing in the autumn. To avoid continual calls at shore stations, these fishing boats deliver their catches to larger boats of between 60 and 75 feet with capacities of 40 to 70 tons, which in turn deliver to canneries at shore settlements.

The development of forestry, fishing, mining, and some other industries on the British Columbia coast has resulted in a large number of coastal settlements, all of which are dependent on service from the sea. Much of this service is by specialized types of shipping already discussed;

---

[1] "Hogging" is the process whereby pulpwood is cut into chips, but the term "hog-fuel" has now become generally applied to all small scrap pieces of wood, from both pulp-mills and sawmills.

a large part of it, however, is made up of shipping of a kind that is not unique to the British Columbia coast but is nevertheless somewhat unusual in the volume involved.

Steam vessels of up to 6,000 tons are common in Canadian coastal traffic. The interesting feature of such traffic in British Columbia is that the province had 44 per cent of the Canadian total of arrival of steam vessels in coastal service in 1951, compared with 24 per cent for all the Atlantic provinces combined.[1] It is impossible to determine what proportion of the British Columbia percentage is made up of steam-driven vessels such as tugs, and what proportion consists of the coastal passenger-freight vessels. The latter are the main means of transportation to isolated coastal settlements for passengers, mail, some mechanical equipment, and some of the supplies required by each settlement.

There are six shipping companies with offices in Vancouver, which operate thirty-four vessels ranging from 1,000 to 6,000 tons. As a general rule the ships of less than 1,000 tons, of which there are ten, are cargo vessels. There are eleven ships of between 1,000 and 2,000 tons, five between 2,000 and 3,000 tons, and seven from 3,000 to 6,000 tons, that serve as combined freight and passenger carriers. The larger ships operated by the Canadian Pacific Railway and the Canadian National Railways also carry automobiles, principally between Vancouver, Victoria, Nanaimo, and Seattle on Puget Sound. The summer months, because of the heavy tourist traffic to Vancouver Island, are the most significant in this phase of coastal shipping, and the number of ships shown as arriving in British Columbia ports may be made up in part by several arrivals, in 1 day or 1 week, of these vessels, which all operate on scheduled runs from Vancouver. For the coastal settlements other than those on Vancouver Island the coastal passenger-freight ships maintain an all-year, scheduled service.

In the case of the larger coastal vessels, federal regulations require certain wireless communication equipment. For the smaller vessels, such as the fishing boats and tugs, there are no such regulations. Despite this, the British Columbia coast is outstanding for the very large number of radio-telephone calls transmitted. In 1950 there were 1,574 vessels of all types equipped with radio-telephones, and the Northwest Telephone Company, a toll service branch of the British Columbia Telephone Company, transmitted approximately 8,000 calls from Vancouver during July 1950. This figure is about four times that of Seattle and considerably more than the monthly average of 5,000 calls in the port of New York. In addition to ships equipped with radio-telephone, over thirty fish canneries operate land stations. In this case the equipment is used to notify fishing boats of locations of fish, to notify packers to collect fish from fishing boats, for emergency work, and for general work organization.

---

[1] Department of Trade and Commerce, Dominion Bureau of Statistics: Annual Shipping Report, 1951.

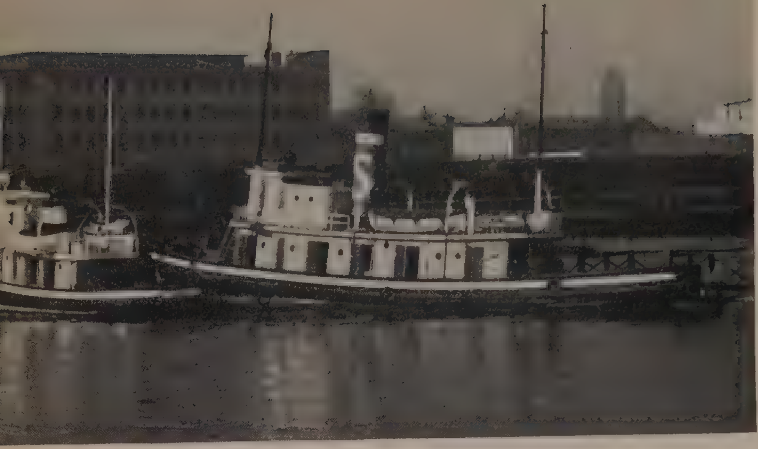

Figure 2. Trollers on left; covered scows in background.

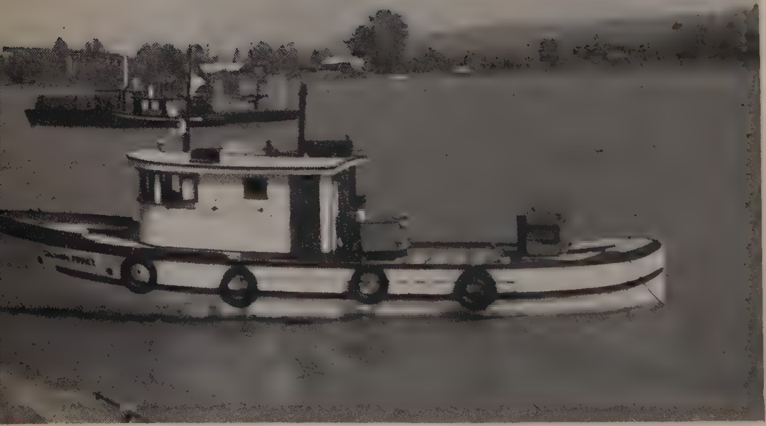

Figure 3. Open-type scows loaded with sand and gravel in foreground; flat type log booms in background.

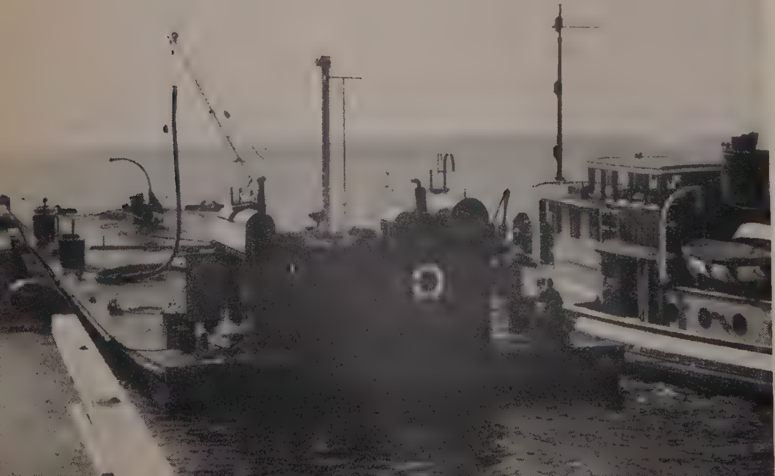

Figure 4. Covered type scows.

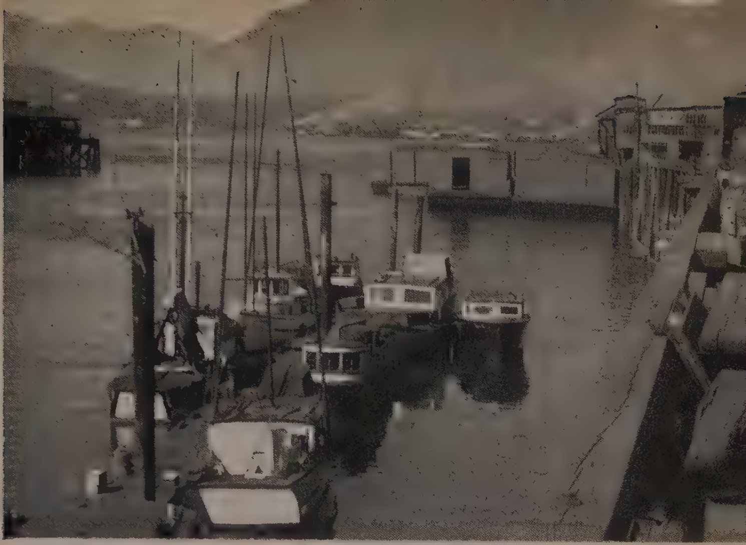

Figure 5. Tugs.

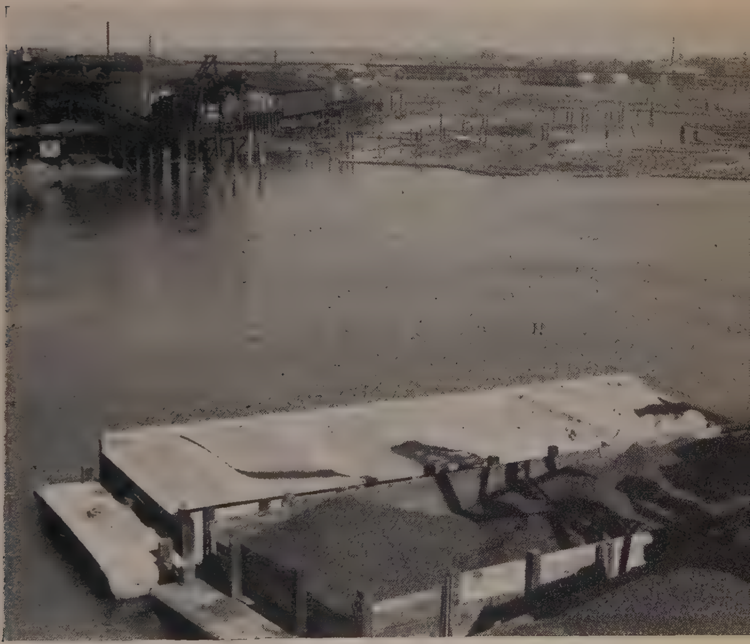

Figure 6. Gill netter.

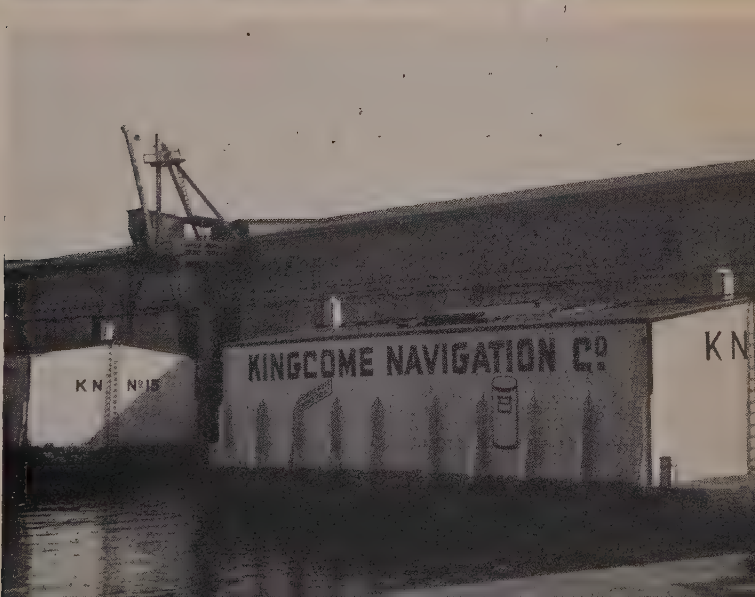

Figure 7. Petroleum barge. This is an example of a scow being called a barge.

This last phase, work organization, is one of the main assets of radio-telephone. With head offices of shipping firms, manufacturing companies, and oil refineries in Vancouver, and with much of their various activities spread over hundreds of miles of coast-line, waste of time, increased cost, and loss of efficiency would result if means of quick communication were not available. By means of the telephone, however, company dispatchers in Vancouver make multiple, or "conference" calls to all their ships. Certain times are alloted each company and each in turn sends out sailing instructions, schedule alterations, and changes of pick-up or delivery calls, plus any company business affecting the ships at sea. In addition, there are a very large number of "non-conference" calls between shore stations and all the various kinds of coastal shipping, plus distress signals, which average two a week and take priority over all other calls.

CONCLUSION

The geography of the coast of British Columbia—topography, climate, resources and their uses, and location of settlements—have all combined to impose a reliance on shipping, and to permit the development and operation of certain specialized forms of shipping. The development of natural resources has stimulated settlements and industry; these in turn have demanded shipping. With all the coast virtually inaccessible from the land, except through the Fraser Valley to Vancouver, shipping activity, and thus the economic control of the coast, has become concentrated in this port city. This localized control, and the special forms of shipping that have resulted from the environment, form a peculiar, but fundamental, facet in the economy of Canada's West Coast.

RÉSUMÉ

Pour comprendre le rôle que jouent les transports maritimes dans l'économie de la Colombie-Britannique et de l'Ouest du Canada, il faut considérer d'une part, la géographie du pays, autant physique qu'économique et humaine, et d'autre part, les méthodes utilisées pour acheminer ces riches ressources naturelles de l'intérieur vers les centres industriels et commerciaux de la côte.

On a créé ou adapté, d'après la nature des denrées à transporter telles que les billes de bois, le bois d'oeuvre, la pâte à papier, le papier-journal, le sable et le gravier, et d'après les conditions de navigation entre les régions productrices et le port de Vancouver, de nouveaux types de transporteurs. On se sert de barges, de chalands, d'estacades et de radeaux de bois tirés par des remorqueurs. Ce genre de trafic, classifié comme "unrigged traffic", ou acheminé par transporteurs sans mâtures, égale plus de 85 p. 100 du total de ce trafic au Canada en 1951.

Les navires de pêche viennent en second lieu; leur tonnage de jauge équivaut à 46 p. 100 du tonnage annuel total de tous les navires de pêche entrés dans les ports canadiens en 1951. Bateaux seineurs, chalutiers et

autres types de navires sont utilisés ordinairement dans les eaux en bordure du littoral où l'on pêche de grandes quantités de saumon, de flétan et de thon.

Enfin le dernier type de transport maritime consiste en caboteurs d'une jauge allant jusqu'à 6,000 tonnes, servant au transport général des passagers, des denrées et de la poste. Quoique ce type de navire soit généralisé au Canada, le trafic des caboteurs dans les ports de la Colombie-Britannique représente quand même près de 44 p. 100 du trafic total par caboteurs dans les ports canadiens.

Les opérations maritimes le long de la côte ainsi qu'une grande partie des opérations forestières et des pêcheries sont contrôlées de Vancouver par radio-téléphone. On enregistre chaque mois, entre Vancouver et les navires au large et les postes du littoral, un plus grand nombre d'appels que dans l'ensemble du port de New York pour une même période de temps. Le réseau de communications qui rayonne de Vancouver permet à ce port et à cette ville de contrôler pratiquement tout le transport maritime aussi bien que l'activité commerciale et économique de toute la région côtière de la Colombie-Britannique.

A RECONNAISSANCE SURVEY OF THE SADDLE LAKE DISTRICT, ALBERTA

W. M. Baker[1]

The Saddle Lake district of Alberta, together with a similar and contiguous area in Saskatchewan, is part of the larger geographical region of western Canada often referred to as the "Pioneer Fringe". This reconnaissance survey presents a broad geographical picture of the physical and cultural environment of a part of that district.

The area discussed here comprises roughly 2,520 square miles and extends from ranges 1 to 14 west of the Fourth meridian and from the north of township 58 to the north of township 63. The heart of the area lies between North Saskatchewan River and Beaver River, about 150 miles north and east of Edmonton.

PHYSICAL ENVIRONMENT

GEOLOGY AND TOPOGRAPHY

Geological formations of the Mesozoic Era immediately underlie the whole district. In the south and in the west is the Belly River formation, with beds consisting of clays, sandstones, and lignite coals. The direct influence of these geologic beds on the soil was not determined, but some of the sands from this formation were probably re-sorted by water after glaciation. In the north and in the east is the Lea Park formation of the Lower Cretaceous, with beds consisting of soft marine shales, medium grey to bluish in colour, with occasional nodules and gypsum crystals. The non-marine Benton formation is also composed of shales. Both the Lea Park and Benton shales appear to have had a direct influence on the soils, imparting to them much of their heavy clay character[2, 3].

The area is one of moderate elevation. The greatest altitudes (2,200-2,300 feet) are reached in the southeast, whereas the lowest elevation (1,600 feet) is in the valley of Beaver River at the boundary between Alberta and Saskatchewan. Areas between 1,700 and 1,800 feet are found in the eastern half of the district. The topography is rolling to moderately hilly, with some flat areas associated with old glacial spillway floors. The whole of the area has been glaciated and covered with drift to a considerable depth. The general direction of the ice push appears to have been from the northeast and is presumed to be associated with the Keewatin ice-sheet[1]. Several spillways, such as those of the Beaver and Kehiwin Valleys, cut across the area, and their depth in places restricts travel to some extent. Two well-developed moraine systems were noted. One runs about 3 miles south of the village of Cold Lake, crosses the main highway and trends to the south and west into Saskatchewan; the other, just north of St. Paul, trends north and west. The Saddle Lake Topographic Sheet shows a certain degree of elongation of lakes and a southwest-northeast trend to many stream courses associated with this moraine. Many sandy kames and outwash gravels were found. Drumlins were encountered, but small drumlinoid features were more common.

---

[1] W. M. Baker, B.A., Toronto, M.A., London. The field work on which this paper is based was carried out during the summer of 1949 in collaboration with the Surveys and Mapping Branch, Department of Mines and Technical Surveys. The field report was revised and brought up to date by Elizabeth de Kuiper, B.A., British Columbia.

[2] Mitchell, J., Moss, H. C., Clayton, J. S.: Soil Survey of Southern Saskatchewan; Soil Survey Report No. 12, Univ. of Saskatchewan. Saskatoon, pp. 229–231 (1944).

[3] Wyatt, F. A., Newton, J. D., Bowser, W. E., Odynsky, W.: Soil Survey of Wainwright and Vermilion Sheets; Bull. No. 42, Univ. of Alberta, Edmonton, pp. 112–113 and 119 (1944).

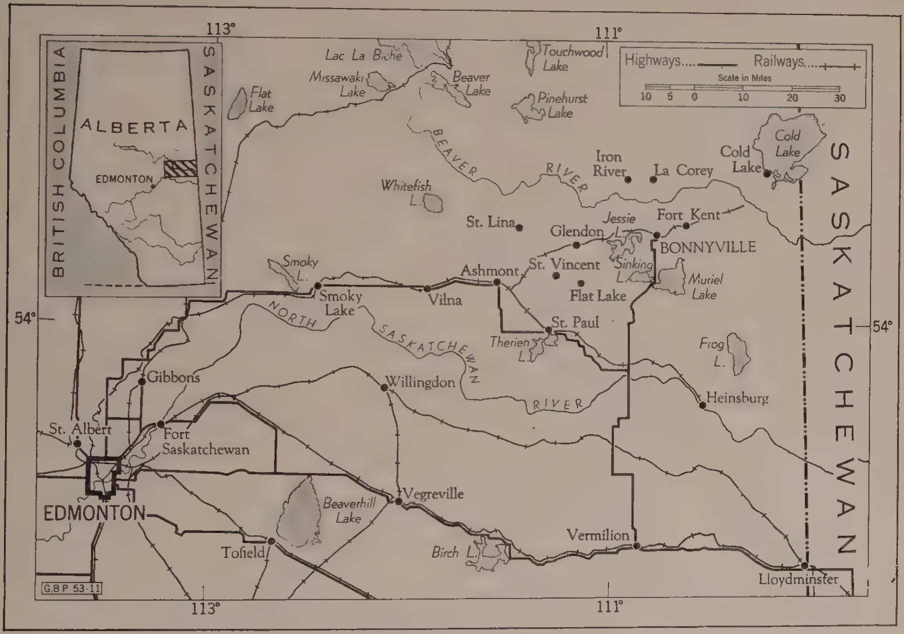

Figure 1. Location map.

The present drainage pattern is not yet completely organized. Swamps, sloughs, and small lakes are abundant, but these are rapidly drying up. An assumed drier climatic cycle, and the ditching and draining of these areas by farmers, contribute to this condition. Certain lakes, such as Jessie Lake and Sinking Lake, are disappearing, and much of the former lake bottoms is now covered with a coating of precipitated salts. The larger lakes, such as Muriel Lake, Moose Lake, and Cold Lake, show no signs of disappearing. Most of the secondary streams are intermittent. The clearing of the land, together with the practice of burning muskegs, have been major factors in contributing to the loss of permanent flow.

---

[1] Ibid., p. 119.

CLIMATE

The climate of the area is continental. The mean average annual temperature during 1947 was 29·15°F.[1]. The mean annual range in temperature varies from an estimated mean average July temperature of 60°F. to an estimated mean average January temperature of 1°F. (Figures 2, 3). The growing season is short, but sufficient for the major Canadian cereals, with the exception of corn. Crops, however, frequently suffer frost damage in the spring and autumn.

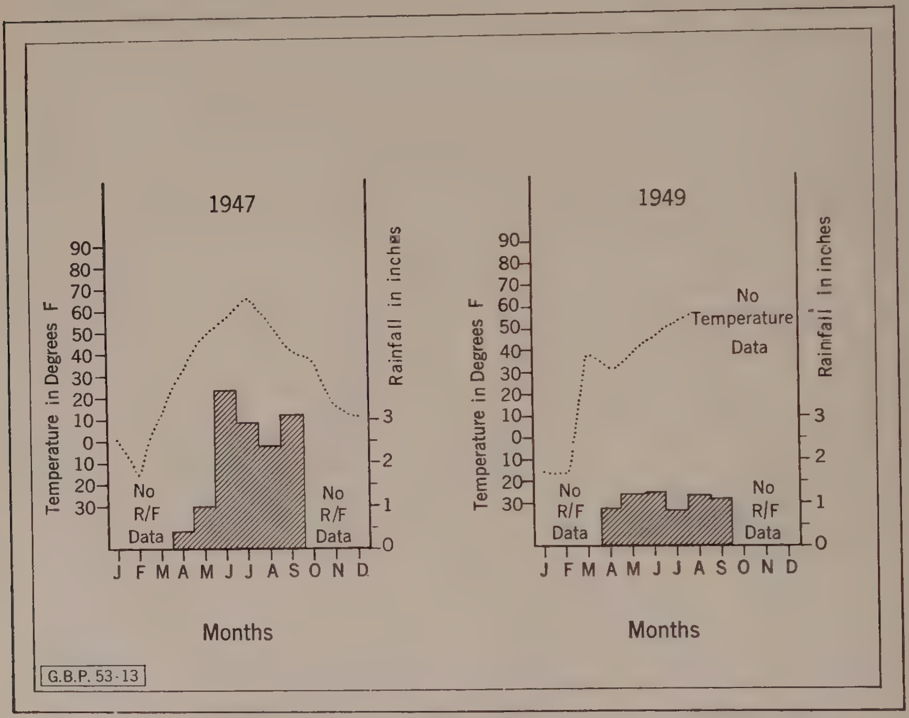

Figure 2. Climatic charts for 1947 and 1949, Bonnyville, Alberta.

The maximum precipitation occurs in the summer. In general, it is adequate for the growing of fairly good crops, but periodic droughts do occur: 1949 was a year of serious moisture deficiency, with only 6·24 inches of rainfall recorded during the growing season, as compared with 13·04 inches in the same period of 1947 (Figure 2). Hail occurs occasionally, but losses suffered from this do not appear to be great. Adverse autumn weather conditions are not uncommon and sometimes delay threshing until spring.

---

[1] The temperature statistics for Bonnyville were obtained from the C.N.R. station and the rainfall statistics from the Searle grain elevator operator.

SOILS

This district lies on the transition belt between the grey wooded podsolic soils of the forested regions and the black soils of the grassland areas to the south. The pedological pattern is a mosaic of rapidly changing soils, and any mapping of this district would have to be in considerable detail to be of any immediate applied value.

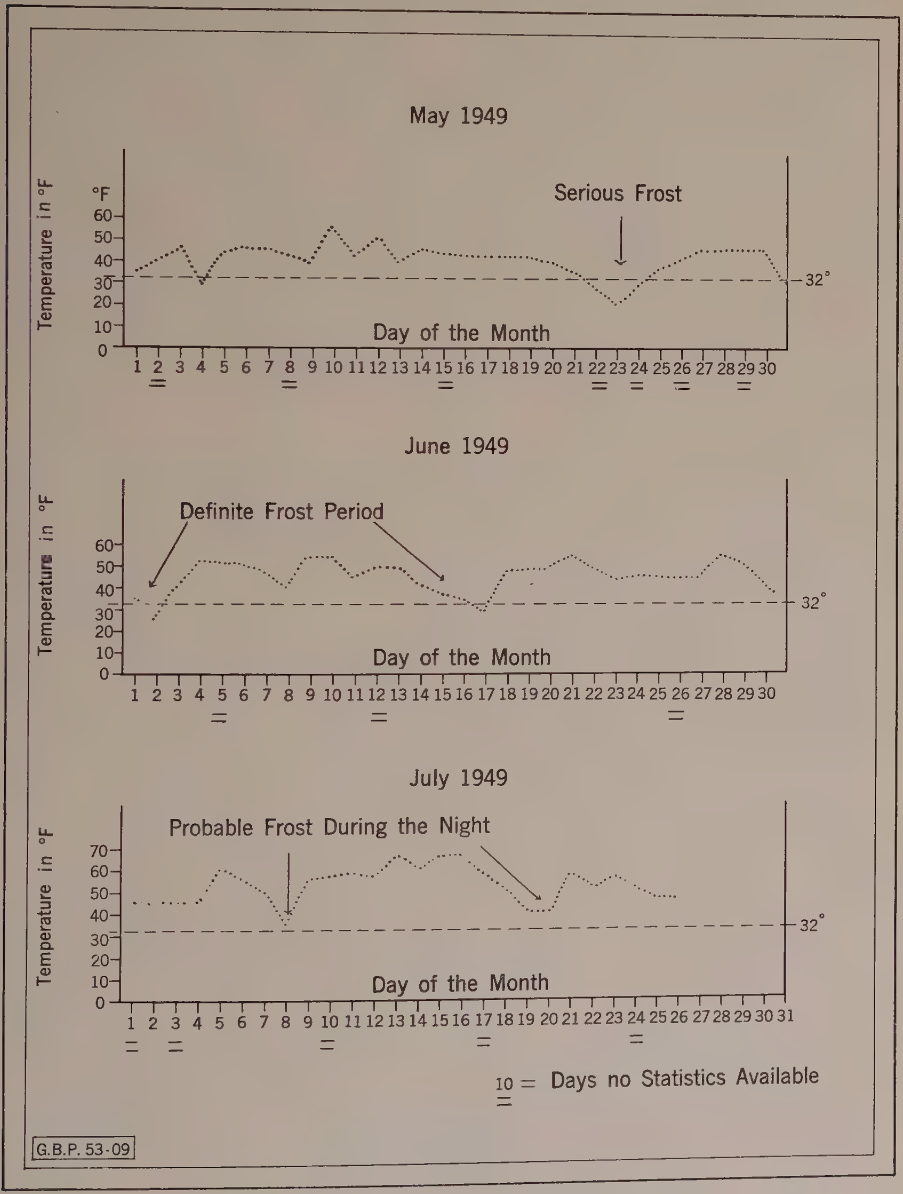

Figure 3. Monthly temperature graphs for Bonnyville, Alberta, 1949.

The podsols and the grey wooded soils are found within the light-coloured soils of the timbered regions. Some areas of podsol soil were encountered on the better drained locations, and associated mainly with sands. The grey wooded soils, associated with upland forested regions and found here in a knoll and depression topography, cover an extensive area in the more northerly townships. These soils evidence an affinity to grassland soils in that they show less acid in the upper horizons than in the lower ones. The internal drainage varies from excessive on the steeper slopes to impeded in the depressions, but in general the drainage is adequate.

Two zonal soils of the true forest grassland transition area, the shallow black soils and the transition soils, occur in this district. These soils are the most fertile, with the shallow black soils having a distinct superiority over the transition soils. They are found in a knoll and depression topography, although the shallow blacks are more often associated with low-lying areas. The parent material is undifferentiated till with stones and boulders proving a serious handicap in some areas.

Several intra-zonal soils are present, although they do not occupy very extensive areas. Hydromorphic and halomorphic soils were encountered in the low-lying areas of poor drainage in the more northerly parts of the district, whereas calomorphic soils were found a few miles west of Cold Lake[1].

In general, the slopes in this district are not severe enough to give rise to serious erosion problems. In the old lake bottom, run-off presents a minimum hazard of erosion. However, the steep sides of many of the old glacial spillways and the steeper drumlin slopes are readily subject to serious gully erosion. Many of these slopes are now under cultivation and little precaution is being taken against erosion.

Soil depletion is serious in the district. The potassium content of the soil is generally sufficient, but the phosphorus and sulphur content is deficient. The grey wooded soils show deficiencies in nitrogen, as well as a generally low organic content. Mixed farming, rotation cropping, and the increased use of commercial fertilizers are essential for the preservation of soil fertility over long years of cultivation.

VEGETATION AND WILDLIFE

This district lies on the southern tip of the Canadian Boreal Forest, but the present vegetative pattern appears to be a direct response to the repeated devastation by fire. In the upland regions, poplar species constitute an estimated 90 per cent of the forest cover. Trembling aspen is the dominant tree, but balsam poplar is very common, and some largetooth aspen also occurs. Some isolated stands of white spruce are found in the upland areas, whereas jack pine is the common tree of the sandy, burned-over upland areas. The swampy lowland areas and muskegs contain black spruce and tamarack. Willows are common in burned-over lowland areas where ground fires have stripped off the vegetative mat down to the lower horizons of the soil.

---

[1] For further details on soils *See*:
Mitchell, J.: op. cit., pp. 45, 104, 116–119, 139, 158–162, 166–168.
Wyatt, F. A.: op. cit., pp. 52–98.

The main types of grasses encountered were wild barley or foxtail barley and American slough grass. These grasses occur around sloughs, marshes, and streams.

Certain noxious weeds were noted. Sow-thistle was particularly troublesome around Charlotte Lake, and definite steps have had to be taken to curb its spread. Wild oats were noted in many fields, and in some places constituted an estimated 25 per cent of the grain field cover. Lamb's quarters, Canada thistle, and wild mustard were other commonly encountered weeds[1].

Fish are still plentiful in many of the larger lakes, but indiscriminate fishing has seriously depleted most of the major game fish. Cold Lake formerly abounded in lake trout, but the difficulty of controlling commercial fishing led to the near elimination of this fish. However, the banning of commercial fishing since 1947, together with a re-stocking program and strict control of game limits, is rapidly restoring the trout population. Jackfish are the most common of all fish caught, but lack the game qualities so desired by fishermen.

Ducks are plentiful. The small lakes and marshes provide a suitable habitat for this bird, but the rapid drying up of these centres will restrict their numbers. Small game birds, such as prairie chicken and partridge, large marsh hawks, magpies, crows, and blackbirds are numerous.

Muskrat and beaver were encountered south and west of Reita Lake. Hunting and the artificial and naturel desiccation of the small lakes and swamps have been responsible for a marked decrease in the number of these animals. The wolves and black bears present are a menace to sheep and young cattle in the more isolated areas. The large game animals are rapidly decreasing, although deer are still common and moose can be found in the more isolated spots of the northern strip of townships during the late autumn and winter.

SETTLEMENT

The population of Census Division 13[2] increased from 1,490 in 1901 to a peak of 33,172 in 1941 and decreased to 30,152 in 1951. This increase is not outstanding, but is typical of the pioneer fringe. So also, it appears, is the 10 per cent drop in population during the last decade. Such a drop by no means indicates a lack of success in the pioneer venture. It should not be read to indicate a deterioration in conditions, rather, it reflects an improvement. For it is the result of a better organization of the land, with a growing tendency to consolidate farms. When the first rush of settlers came in the land was eagerly divided up and then became subdivided. As a result some of the holdings were too small.

---

[1] For a more complete account of grasses and weeds *See:* Wyatt, F. A.: op. cit., pp. 23–28.

[2] Census Division 13, although larger, is representative of the area under consideration.

In an area such as this the margin of risk is considerable. The variability in the growing season, in the onset of frosts, and in the distribution of rainfall is marked. One of the best ways of overcoming this is to have an extra field or two. Safety is bought with space. Consequently, smaller holdings have in many instances been given up and have become absorbed in larger ones.

This movement has been especially active as farming has become increasingly mechanized. The large capital outlay needed for modern machines is best met and justified by a large producing unit; otherwise it takes too long to write off the initial expenditures.

Much of the surplus farm population has left the district for lack of alternative employment. This does not always happen. In some areas lumbering, construction, work in connection with oil developments, or mining may take up the slack. However, it is evident from the growth of Bonnyville and other urban centres that some of the slack is taken up in the community through urban growth.

The improvement of roads, the mechanization of farming, and the extension of urban services have all gone together. Occasionally a family will live in the town, because of the physical and social amenities it offers, and motor out to the farm each day to attend to the farm work. This can be done where no stock are carried and grain farming is the sole activity.

Furthermore, farmers who formerly used the services of carpenters, smiths, and builders in local villages, and were content to patronize local stores and to attend the local rink or social, now go habitually to town. Thus the rural hamlet has declined in favour of the more centralized and efficient town. This has happened particularly among the Anglo-Saxon settlers.

The early settlers of the area, in the first decade of this century, were mostly French Canadians. The relatively homogeneous composition of the population was markedly altered by European immigration from 1926 to 1936. Between 1930 and 1935, some resettlement occurred from the drought and insect-plagued areas of the southern prairies.

Today the population is highly heterogeneous, although the French Canadians and the Ukrainians, taken together, form more than one-half of the total population. The older generations still speak their own language in their homes, but the younger people speak English in the main.

NUCLEATED SETTLEMENTS

The urban development of the district is young and rapid expansion and contraction of various centres is taking place. In 1951 the rural-urban population ratio was 27,606 to 2,546[1]. There is strong competition between certain towns for the establishment of initial spheres of commercial influence. The towns and villages are purely agricultural marketing centres at present, but some have seen the development of small industries connected with agricultural production. Buildings of wood construction, characteristic of most rural prairie settlements, are evident here, but false facades are not so freely used as in many southern prairie towns.

---

[1] Canada, Department of Trade aud Commerce, Dominion Bureau of Statistics: Ninth Census of Canada Bulletins, Ottawa, 1951.

The development of some towns has been closely associated with various national groups, and to this day these groups form the majority of the population of these towns. Bonnyville is a French-Canadian town, Glendon a Ukrainian centre, and Vilna a Polish village.

The spatial distribution of nucleated settlements in the district partly reflects the influence of certain environmental factors. Beaver River, the major stream, has not seen the development of a thriving nucleated settlement along its entire course through the district. Since the beginning of white settlement, none of the waterways have been important lines of communication, and today none provides an important source of power for local industry. Initial nucleated settlement was closely tied to the soil pattern of the area. All the larger settlements lie in or near stretches of the richer black transitional soils south of Beaver River. No nucleated settlement of any size has developed on the poorer podsoilic and grey wooded soils to the north of Beaver River. Water supply has also been a factor in the development of certain nucleated settlements. The high salt content of the wells of the Fort Kent area renders the water unsatisfactory for industrial use, and, in many cases, unpalatable for domestic and livestock consumption. Bonnyville has grown to a size where its future water requirements present a problem. Glendon possesses no local supply other than wells, whereas Cold Lake has an abundant local supply that will be ample for any of its future needs.

The coming of the railroad enhanced the position of towns along the line. Significantly, these towns were already leading centres before its arrival, owing to their location in select areas of fertile soils. St. Lina, St. Vincent, and Cold Lake are the only sizable settlements lying off the rail line today. In part, the administrative organization of the area contributed to the development of certain towns. Towns such as Bonnyville or Glendon, which became the administrative centre for a Municipal district gained certain advantages. The location of a field representative for an improvement district in a town that is already the administrative centre of a Municipal district further favoured the position of that town.

Bonnyville

A more detailed picture is presented of the town of Bonnyville because of its importance to the whole district. It lies in the heart of an extensive area of black transitional soils (Figure 4). This advantage it shares with Fort Kent, but whereas Bonnyville is expanding, Fort Kent is declining. Glendon, a rapidly developing centre to the west, is attempting to challenge the commercial superiority of Bonnyville, and hopes to secure a larger share of the trade of the Iron River-LaCorey district.

Bonnyville is located in the midst of the black soil belt, the village standing in a rather featureless lansdcape. Many considered that Duclos, a mile to the west, was a more advantageous site than the present location, and the Duclos settlement began to develop around a French Protestant mission. In 1915, a hospital, school, and church were founded and the French Protestant mission has continued to this day.

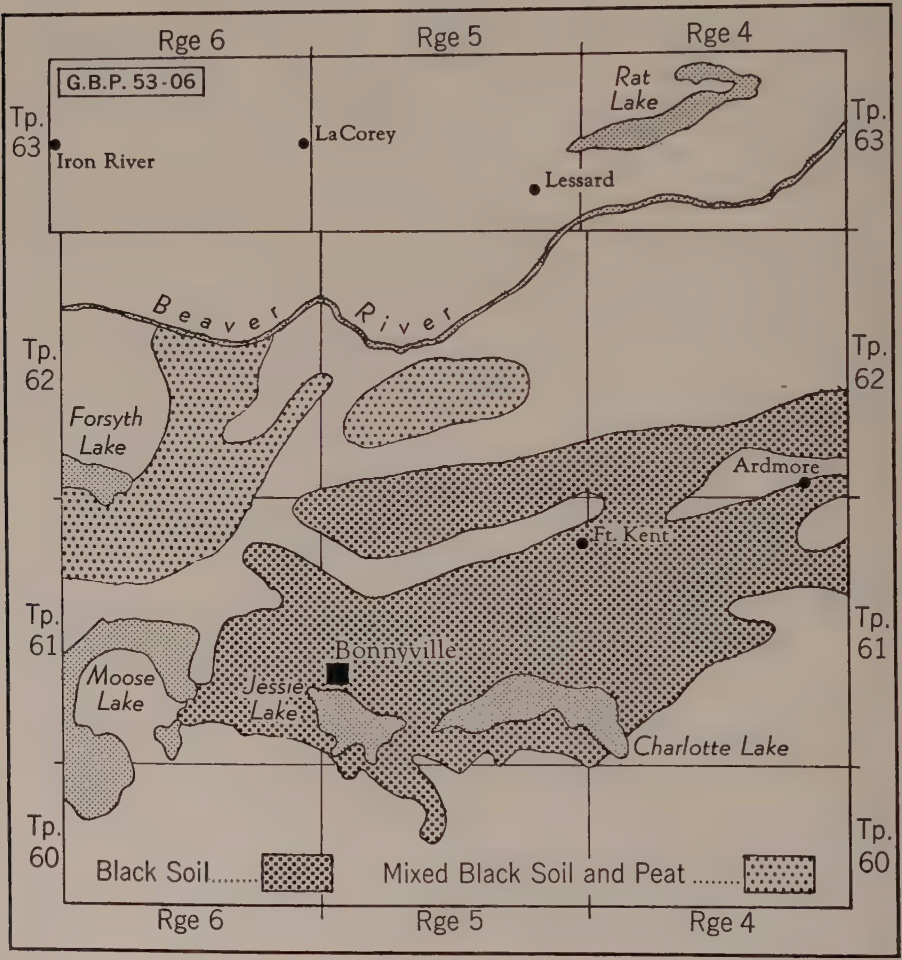

Figure 4. The distribution of black soils in the Bonnyville area (after Alberta Soil Survey).

The population of Bonnyville increased rather slowly at first, with the 1936 census showing a population of 433. From 1936 to 1940 there was a marked increase in growth, with the population reaching 633 in 1941. This declined during the early war years, but increased again after 1943, and by 1951 it totalled 1,139[1]. The composition of the population

---

[1] Canada, Department of Trade and Commerce: op. cit.

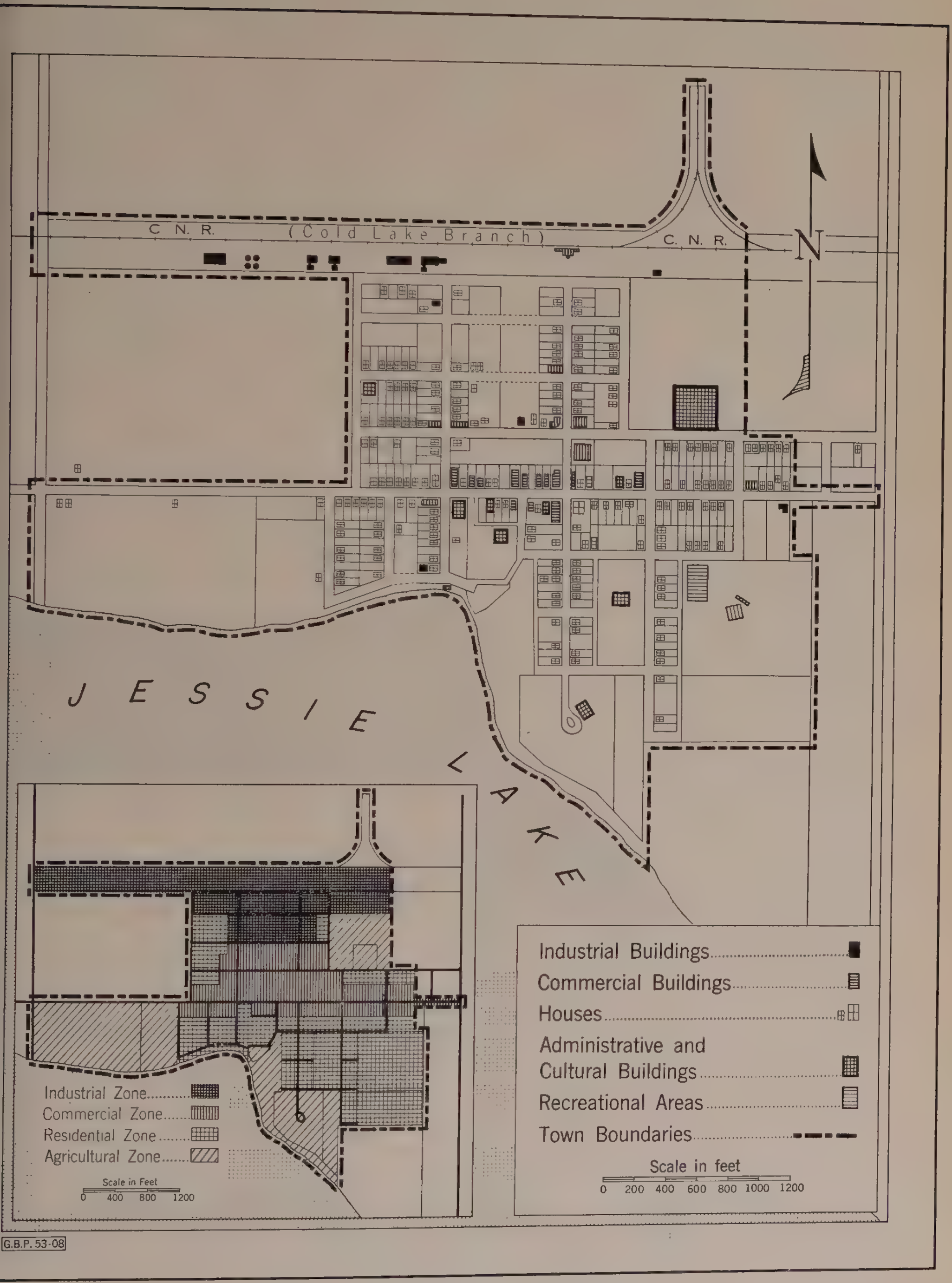

Figure 5. Functional map of Bonnyville.

has altered considerably: although perhaps 70 per cent of the population is French Canadian, Ukrainians are moving into prominence and are sharing in the commercial life of the town.

Bonnyville was erected as a village in 1929 and incorporated as a town in 1948[1]. Bounded on the north by the railroad and on the south by Jessie Lake, the town plan is the conventional grid, with eight east-west streets and six north-south avenues (Figure 5). The commercial core, found on Main Street east and west of Ouimet Avenue, includes the main shops and government offices. A second cluster of shops is found on Ouimet Avenue north of Main Street, and on Albertine Street west of Ouimet Avenue. A feed mill and four elevators are located along the railroad, and a dairy to the east, a creamery and a portable sawmill to the south complete the industrial picture. A Roman Catholic Church and convent are just south of the commercial core and a United Church is located in the northwest of the village[2]. A school, hospital, rink, and recreational grounds, and the leading residential area are found in the southeast, and smaller residential areas are found in the southwest, northwest, and northeast. The most common type of construction is a frame building supported on a cement foundation and generally finished with asphalt siding or rough stucco. In the rural district, modern farm dwellings are replacing the original log houses, although some new log cabins are still being constructed.

The zoning by-law of March 1949 provides for an industrial zone, confined to a narrow belt along the railroad; a commercial zone, large enough for any increase that is likely to take place in the near future; three residential zones, in which buildings are regulated on the basis of floor space (800-600-400 feet); and an agricultural zone. This latter zone is very close to town and it will have to be recognized as a flexible one into which residential buildings will move if the town continues at its present rate of expansion (Figure 5).

Most of the buildings in Bonnyville are heated by wood. Some oil and propane gas is used and some coal is imported for local use. The use of natural gas for heat is likely, although the capital required to exploit the natural gas resources is considerable for a pioneer town. Electricity is supplied locally by diesel generator or by steam turbine from Canadian Utilities Limited at Vermilion. The ground water appears, on analysis, to be of satisfactory hardness for industrial use and will require only chlorination for domestic consumption.

ECONOMIC GEOGRAPHY

AGRICULTURE

Agriculture provides the main economic base for this district. Government policy has aimed at the establishment of the owner-operated farm. The early settlers were granted a 160-acre tract of land, which became their property after the fulfilment of certain specified obligations. Although almost the whole area, with the exception of the Indian Reservation, is classified as land open to application for homesteads, the best of the open land has been taken up. Grants of land are at present being made under the Veterans' Land Act; before a grant is given, the land is inspected by a government agent and its value assessed from the standpoint of making an economically satisfactory homestead. Two other forms of land tenure, cultivation leases and grazing leases (also subject to certain government regulations)[1], make possible the economic use of odd pieces of desirable land as integrated parts in the economy of neighbouring holdings.

---

[1] Alberta, Department of Economic Affairs, Industrial Development Branch: Economic Survey of the Town of Bonnyville, Edmonton, p. 2 (July 1951).

[2] Alberta, Department of Economic Affairs: op. cit., p. 9. An Anglican Church and a Greek Catholic Church are now located in Bonnyville.

In 1939, 77 per cent of the farms in the Bonnyville district were owned by the operators. Some consolidation of holdings is beginning, and with increased mechanization further consolidation is likely. The average size farm is 320 acres. In the Improvement districts, the average size farm is 160 acres, with a cultivation lease and perhaps a grazing lease. On the average, 50 to 75 acres per quarter section are broken. The farm indebtedness amounted to 9 per cent of the average investment per farm[2]. High prices during the war enabled much of this debt to be retired and today fully 90 per cent of the titles are clear.

Wheat is the major crop of the area. However, the soils are not well suited to this monoculture, and mixed farming and dairying are more desirable. Barley does well. Most of the crop is used locally for feed, but some is sold to brewers. Oats fall much below barley in acreage sown, and rye occupies an insignificant acreage. Alfalfa, grown for seed, is an extensive cash crop.

This area is more naturally suited to livestock production than present practices would indicate. Taken as a whole, the cattle of the district are poor. Bulls are being bought under a government improvement scheme, but further improvement is needed. Although a few Herefords and Shorthorns are found, the dual purpose Holstein appears to be the ideal animal for this district. Dairying is carried on, but much more could be done if access to markets was easier. A pasteurization plant is located in Bonnyville, and creameries are located in Bonnyville, Grand Centre, and Glendon. Hog production reached an all time high during the war, but decreased sharply afterwards. Production has subsequently recovered, but it is not likely to reach war-time level. There are some very fine horses in the district, but they do not bring very good prices when sold. Poultry are kept, but not on a commercial basis as there is no available market.

OTHER ECONOMIC ACTIVITIES

Fishing, trapping, lumbering, and highway and railroad construction are secondary to agriculture, but have provided important sources of outside income to the settlers at various times. Drilling operations in

---

[1] Statutes of Alberta: cap. 81, 1949.

[2] Kristjanson, B. H., and Spence, C. C.: Land Settlement in Northeastern Alberta, 1943; Canada, Dept. of Agriculture, Tech. Bull. 63, Ottawa, p. 63 (1947).

Bonnyville have proved the presence of sufficient natural gas for local consumption. Drilling operations for oil were in progress at Ashmont, and seismographic operations were scheduled to begin shortly in the Muriel Lake district. Natural gas and petroleum may in the future form a part of the production value of the area. Industrial development beyond that based on local produce is not likely in the near future.

The Cold Lake area offers some opportunities for the development of tourism, but the district as a whole offers only limited possibilities.

TRANSPORTATION

The transportation pattern of the district evolved from a point of isolation prior to 1900 to a position of moderate accessibility today.

Before the first decade of this century, the area was accessible by horse, canoe, and foot travel only. The railroad, which reached St. Paul in 1920 and the Bonnyville district by 1928, provided the first reliable outlet to the markets of the south, and thus gave a marked impetus to white settlement. Today, the Canadian National Railways, with approximately 85 miles of track in the area, provides a direct communication with Edmonton and the main transcontinental line. There is a daily passenger service between Edmonton and Bonnyville, except on Saturdays and Sundays. The railway carries all heavy freight, such as grain, livestock, and farm machinery.

The road and highway network of the area, although undergoing rapid improvement, is still inadequate. Highway 28, a gravelled road from Edmonton, via Smoky Lake and Ashmont, to St. Paul, is the only provincial highway into the area. It is passable in most seasons of the year. A gravelled district road runs from St. Paul through Flat Lake, Bonnyville, and Fort Kent to Cold Lake, but sections of this road are almost impassable during the rainy spring and autumn, although these unsatisfactory stretches are being improved. Construction of an all-weather road, a continuation of highway 28, has been begun from Cold Lake. This road will shorten the distance and improve the conditions of travel between Edmonton and Cold Lake. A tri-weekly bus service is maintained between Cold Lake and Edmonton all year round, although schedules may be disrupted by unsatisfactory road conditions. Trucking companies, offering cheaper rates and more convenient service, are making large inroads on the railway business, and are now carrying most of the package freight.

In addition to the main highway, there is a secondary network of roads under the jurisdiction of the local Municipal and Improvement districts. The condition and extent of this network varies from one local administration district to another. In general, the network in the Improvement districts is less adequate than that in the Municipal districts. Parts of the area to the south and east of Reita Lake are totally inaccessible by road.

Certain geographic controls in the road pattern are worthy of note. The glacial outwash sands and gravels in the area provide a satisfactory supply of road building materials at a reasonable cost. The old glacial lake bottoms possess a naturally poor drainage and these are the points of greatest trouble after heavy rains. The steep sides of the Beaver spillway, together with the stream itself, also present a problem. Bridge construction across the river is costly and limited to a few points along the river course, and not all the approaches to the bridges down the steep banks of the spillway have been adequately gravelled to ensure safe travel during rainy weather.

No main air routes service this district, but there are a few privately owned aircraft in the area. The larger lakes provide adequate landing space for seaplanes.

CONCLUSION

Settlement in this district has so far been a success and has justified government expenditure on its development. The geographical base is sufficiently rich to maintain a healthy community if the resources are judiciously developed.

The Saddle Lake district offers a laboratory for the study and analysis of the physical and cultural factors involved in pioneer agricultural settlement while these factors are yet in the process of development.

RÉSUMÉ

Le centre de la région du lac Saddle est situé entre les rivières Saskatchewan-Nord et Beaver, à 150 milles au nord-est d'Edmonton, et fait partie de la frange pionnière, qu'on appelle aussi la région des fronts de colonisation.

C'est un pays au relief ondulé et montagneux, avec des élévations de terrain dont l'altitude varie entre 1,600 et 2,300 pieds. On retrouve partout, dans la topographie des lieux, les traces de la glaciation. Le climat continental est sévère mais offre quand même une saison de végétation qui permet aux principales céréales canadiennes d'atteindre leur maturité. Les sols, transition entre les sols gris boisés et noirs, sont pauvres en phosphore et en soufre. La végétation est le résultat des incendies et brûlis. La pêche était florissante mais, à cause de certains abus, la pêche commerciale a été suspendue depuis 1947; quant au gibier il est abondant, en particulier, le canard sauvage. Dans certaines parties isolées, les loups et les ours noirs sont une menace constante.

La population actuelle, d'environ 30,000 habitants, est très hétérogène; on remarque toutefois la prédominance de Canadiens d'expression française et de Canadiens d'origine ukrainienne. Le dernier recensement indique une diminution de la population due à la réorganisation des fermes et à la rareté d'emplois temporaires et complémentaires à la main-d'oeuvre agricole. La population urbaine de la région, d'environ 3,000 personnes,

vit dans des villages qui sont véritablement des centres agricoles dont quelques-uns sont peuplés par un seul groupe ethnique. Les besoins en eau, et, plus tard, la construction de voies ferrées furent des facteurs de localisation du peuplement. Le plus gros centre de la région, Bonnyville, est décrit en détail.

L'agriculture, soit la culture du blé, de l'avoine et de l'orge, est la principale activité économique régionale. Les fermiers sont presque tous propriétaires de fermes dont la superficie moyenne est de 320 acres, desquels 50 à 75 seulement sont défrichés. La région est propice à l'élevage du bétail et à l'industrie laitière, à condition d'y trouver de nouveaux marchés. Au moment de cette enquête, on avait découvert du gaz naturel dans la région et les recherches se poursuivaient afin d'y trouver de l'huile.

THE CORNER BROOK AREA, NEWFOUNDLAND

William C. Wonders[1]

"Boom Town on the Humber" is a phrase frequently applied to Corner Brook, Newfoundland. In 30 years it has developed from a small sawmill hamlet into the second largest centre of population in the province. Reflecting this development, the population of the Humber district in which it is located increased by 220 per cent between 1920 and 1935, and by 36 per cent between 1935 and 1945, compared with 10 per cent and 11 per cent respectively for Newfoundland as a whole[2]. Expansion and growth have continued to keynote the area to a degree unequalled in the island.

As St. John's is associated with the traditional fishing economy and the predominance of the Avalon Peninsula in the life of Newfoundland, so Corner Brook is linked with the comparatively recent pulp and paper economy and the increasing importance of the west coast. Development and prosperity have brought with them, however, problems that had rarely been encountered previously on the same scale in Newfoundland.

THE PHYSICAL SETTING

Corner Brook is located on Humber Arm of the Bay of Islands, on the west coast of Newfoundland. By sea, it is 740 miles from Montreal and 430 miles from Halifax. Although a seaport, it is almost 25 miles inland from the open waters of the Gulf of St. Lawrence. Approximately 9 miles from the gulf, the Bay of Islands divides into three arms. Of these the southernmost, Humber Arm, is the most important, leading as it does into the Deer Lake lowland of the interior. Humber Arm trends southeast for 7 miles from its entrance, and east for the remaining 6 miles to its head. In width it averages about a mile. Humber River empties into the head of this arm after following a superimposed and antecedent course through the Long Range Mountains for the last few miles, giving rise to a spectacular juvenile gorge with abrupt cliffs 500 to 1,000 feet high on either side. The Corner Brook area as included in this paper extends from the mouth of the river about 5 miles west along the south shore of Humber Arm to Petries Cove. It extends inland only about 2 miles. It may be said to possess geographical unity although with significant variation in local detail[3].

---

[1] William C. Wonders, B.A., Toronto, M.A., Syracuse, Ph.D., Toronto. Associate Professor of Geography, Univ. of Alberta. This paper is based on a survey of the settlements of the railway belt on the island of Newfoundland made by the author for the Geographical Branch in 1949.

[2] Canada, Dept. of Trade and Commerce, Dominion Bureau of Statistics: Province of Newfoundland: Statistical Bankground; Ottawa, 1949.

[3] Twenhofel, W. H., and MacClintock, Paul: Surface of Newfoundland; Bull. Geol. Soc. Amer., vol. 51 (11), November 1, 1940, pp. 1665–1728.

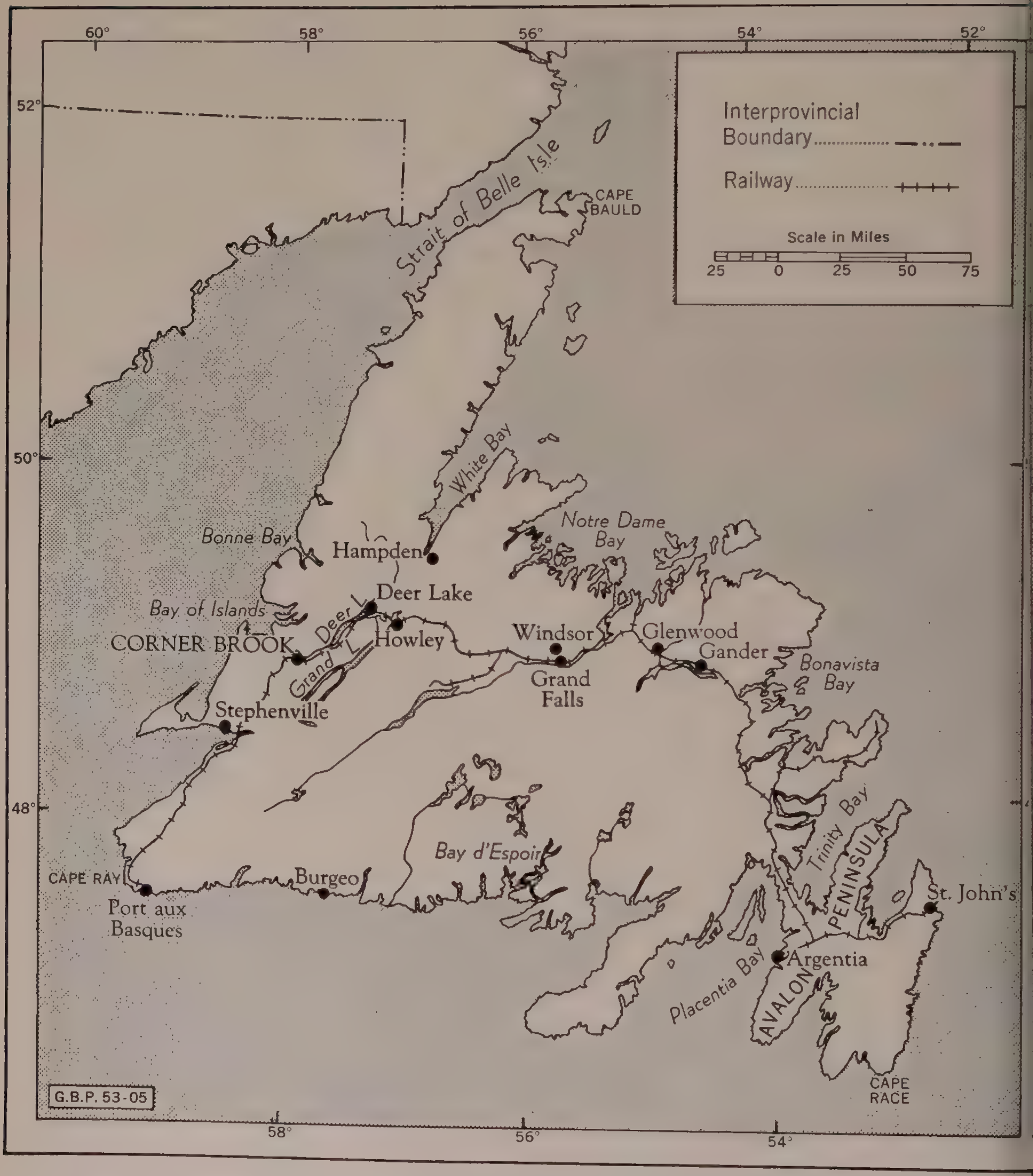

Figure 1. The island of Newfoundland, showing the spatial setting of the Corner Brook area.

Part of the West Coast Lowland of Newfoundland, the area is a hilly lowland[1] between the intrusive complex of the Blow-me-Down (Blomidon) Mountains to the west and the igneous Long Range Mountains to the east. Immediately south of the town of Corner Brook the general elevation is about 300 feet above sea-level, increasing to 700 to 1,000 feet to the east and south. Resistant bedrock west of the town results in 700-foot elevations near Humber Arm. These various elevations, probably representing former interrupted erosion levels, have been of importance in the expansion of local settlement. In sectors underlain by shale, elevations are generally lower.

The Bay of Islands and its arms have been overdeepened and oversteepened by ice to produce typical fiords between the Blow-me-Down Mountains on the south and the North Arm Mountains on the north. The U-shaped valleys rise to 1,000 feet above sea-level, with bottoms 500 to 700 feet below sea-level, though the lower elevations along the upper parts of Humber Arm do not produce so striking an effect. Although glaciation in deepening Humber Arm facilitated present-day passage of ocean-going vessels to its head and imparted great scenic beauty to the arm, it also accounts for two physical disadvantages. Because of the great depths in the arm there are few good anchorages for shipping. The steep slopes of the arm also handicap building and provision of service facilities.

Besides its severe erosive effects, glaciation left a thin veneer of till in some sectors and resulted in local glacio-fluvial deposits. The most prominent of the latter is a large delta just east of Humbermouth at an elevation of 150 feet. Similar material occurs south of Corner Brook West. Gravelly till has been used for filling in and extending the waterfront. Dropping sea-levels as a result of adjustment to deglaciation[2, 3] produced local terraces, of which the most striking in Corner Brook occurs at an elevation of about 50 feet. These form a particularly important factor in settlement, providing level land of great value.

Several small juvenile streams flow into the south side of Humber Arm in the Corner Brook area. Petries Brook in Curling and Bells Brook in Corner Brook West are the only ones with sufficiently well-developed valleys to have affected settlement, other than Corner Brook. The latter, emptying into the arm about 2 miles from the mouth of Humber River, is the only major stream in the area. At its mouth is the town of Corner Brook.

---

[1] Walthier, T. N.: Geology and Mineral Deposits of the Area between Corner Brook and Stephenville, Western Newfoundland; Nfld. Geol. Surv., Bull. No. 35, St. John's, 1949, p. 10.

[2] MacClintock, Paul, and Twenhofel, W. H.: Wisconsin Glaciation of Newfoundland; Bull. Geol. Soc. Amer., vol. 51 (11), November 1, 1940, pp. 1729–1756.

[3] Flint, Richard Foster: Late Quaternary Changes of Level in Western and Southern Newfoundland; Bull. Geol. Soc. Amer., vol. 51 (11), November 1, 1940, pp. 1757–1780.

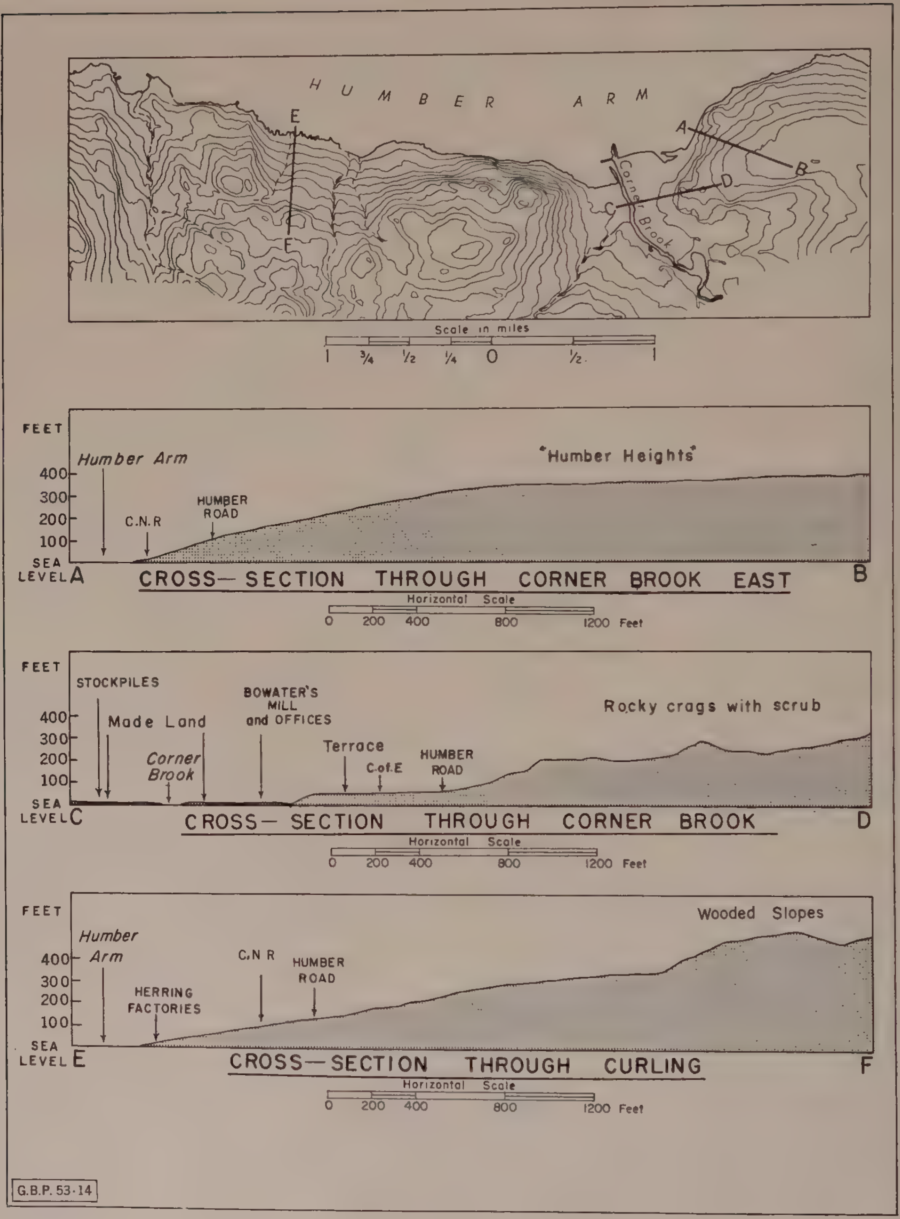

Figure 2. Relief of the Corner Brook area.

The vegetation of the area consists of second-growth, mixed forest, giving way to scrub and semi-barrens on the rocky crags east and west of the town of Corner Brook. In the vincity of Corner Brook West particularly, and to a less degree around Corner Brook East, grazing and fuel gathering further restrict forest regeneration. In the valley of Corner Brook and around Curling, trees are relatively abundant.

HISTORICAL BACKGROUND

Settlement on Humber Arm apparently began about 125 to 150 years ago. When Captain Cook, R.N., surveyed the west coast, including Humber River from its mouth to Deer Lake, in 1768, there were no settlers. About 1800 it is recorded there were two men, one from Dorsetshire, with their families located on the Bay of Islands. That any appreciable settlement developed at all was surprising, as the area was included in the French Treaty Shore. Though English sovereignty on shore was recognized, the French were guaranteed fishing rights, including the right to land and cure their fish, and any fixed settlements that "interrupted in any manner" the French fishery were to be removed. Warships of both countries patrolled the shore and both countries looked with considerable hostility upon settlers[1]. Yet fishermen settlers gradually increased. They were a mixture of English west countrymen and French, of which some were European but more were Acadian from Cape Breton Island.

Though political disagreements further intensified, settlement expanded considerably after the middle of the 19th century with the development of the local herring and lobster fisheries. Small communities were established on terraces and inlets along the arm. In 1871, 200 families were reported[2] on the arm, depending primarily upon the herring fishery, but also going out to the headlands for cod. Of the various settlements, Summerside, on the north side of the arm, was the most important. Opposite, on the south side, Curling was insignificant in comparison. A sawmill existed at Corner Brook, cutting lumber from the fine timber on the main river[3]. Spars 60 feet long and 30 inches in diameter, without a knot, were cut. In 1877 Curling gained prominence by being chosen as the residence of the first magistrate on the west coast—a Royal Navy commander, who erected a court house and his imposing home there. However, Summerside, possessing a sheltered anchorage in Petitpas Cove, remained the most important settlement until the coming of the railway. It was the scene of most of the commercial activity and industry of the entire bay, and branches of mainland business firms were established there.

---

[1] *See* Newfoundland, An Introduction to Canada's New Province: Canada, Dept. of External Affairs, and Dominion Bureau of Statistics, Ottawa, 1950, pp. 24–26, for a brief account of the French Treaty Shore. A more complete account is given by A. M. Fraser: The French Shore; Newfoundland—Economic, Diplomatic, and Strategic Studies, R. A. Mackay (ed.) Toronto, Oxford Univ. Press, 1946, pp. 275–332. France did not give up her claims to exclusive fishing rights on this shore until 1904.

[2] Lt. Brown, R.N., in Jnl. of the Legislative Council of the Nfld. Govt., 1872, quoted in "The Western Star", Corner Brook, April 4, 1950.

[3] The present names are not the original names of the settlements mentioned in this paragraph, but are sed to avoid confusion. Names have changed considerably throughout the area.

As the railway was pushed westward, it was expected that Corner Brook, where the sawmill had been established in 1867 by a Nova Scotian operator, would be chosen as the divisional headquarters with its roundhouse, machine shops, and homes of the railway men. Instead, the site chosen was at the mouth of Humber River, where nothing existed previously but which was to become known as Humbermouth. Large numbers of American fishing vessels (as many as eighty on one occasion) visited Humber Arm for the herring fishery, leaving large amounts of money for wages and bait. With the arrival of the railway at Curling in 1898, it became the centre of the herring industry and displaced Summerside as the major settlement on the arm. Businesses and families moved across the arm to locate on the railway, and even a local newspaper was established. The American fishermen were responsible also for the development of a rather large American sportsman industry as they spread news of the beauty, game fish, and hunting possibilities of the area.

In 1900 there were perhaps 300 people at Humbermouth and Corner Brook, though there was not even a railway station at the latter point and apart from those working at the sawmill the few local people were mainly hunters, guides, or fishermen. In comparison, there were over 600 people at Curling. The predominance of the latter population cluster continued until 1923. As early as 1910, efforts had been made to establish a pulp and paper industry in the Humber Valley but nothing developed until after World War I. The transformation of the small community of Corner Brook started in 1923 when mill construction began at the mouth of the brook. In 1925 the mill was completed, and the new community soon outstripped all others on Humber Arm and became the most important settlement in western Newfoundland. The original company has now become the present Bowater's Newfoundland Pulp and Paper Mills Limited.

THE PRESENT-DAY SETTLEMENT COMPLEX IN THE CORNER BROOK AREA

Five major population clusters make up the settlement complex of the Corner Brook area. From east to west these are: Humbermouth, Corner Brook East, Corner Brook, Corner Brook West, and Curling. Administratively all cannot be spoken of as "urban" according to the Census of Canada definition[1], though in actuality they collectively form an urban area. Corner Brook East, Corner Brook West, and Curling are incorporated, Corner Brook (Townsite), is a company-controlled town, and Humbermoth is an unincorporated settlement.

When the pulp and paper mill was established at Corner Brook in 1923 there were about 200 people in the general vicinity. There are now over 2,800 people in Corner Brook (Townsite)[2], and over 13,000 in Greater

---

[1] "the rural population is all the population living outside of the boundaries of incorporated cities, towns or villages. This population may reside in organized rural municipalities, townships, or parishes or it may reside in areas which are unorganized", Census of Canada, 1941, vol. II, Introduction, p. xvi.

[2] All current population figures are from the Ninth Census of Canada, 1951. The term "Townsite" is often used locally to designate the company-controlled town of Corner Brook, as distinct from Corner Brook West and Corner Brook East.

Corner Brook, including Corner Brook West and Corner Brook East. Including Humbermouth and Curling, there are over 17,800 people in the Corner Brook area, making this the second centre of population in Newfoundland, surpassed only by St. John's. Its inhabitants are dependent, directly or indirectly, upon the operation of Bowater's Newfoundland Pulp and Paper Mills Limited, the larger of the two pulp and paper companies in the province, with its head offices and mills located in Corner Brook. The effects of this mill, company, and town are island wide in scope. Controlling 11,420 square miles of timber, it is estimated that 10,000 Newfoundland men and women derive their living directly from the company, with a $14,000,000 annual payroll[1]. About one-fifth of the total population of the island gains directly from the company's operations, and of the $43,000,000 worth of pulp and paper exports from Newfoundland in 1952, Bowater's contributed $25,000,000. The Bowater Company, as it is today, represents an investment of $95,000,000 in Newfoundland[1]. Although the closely spaced settlements of the Corner Brook area are interdependent they possess individual characteristics, reflecting their independent origin and the variety of local geographic detail.

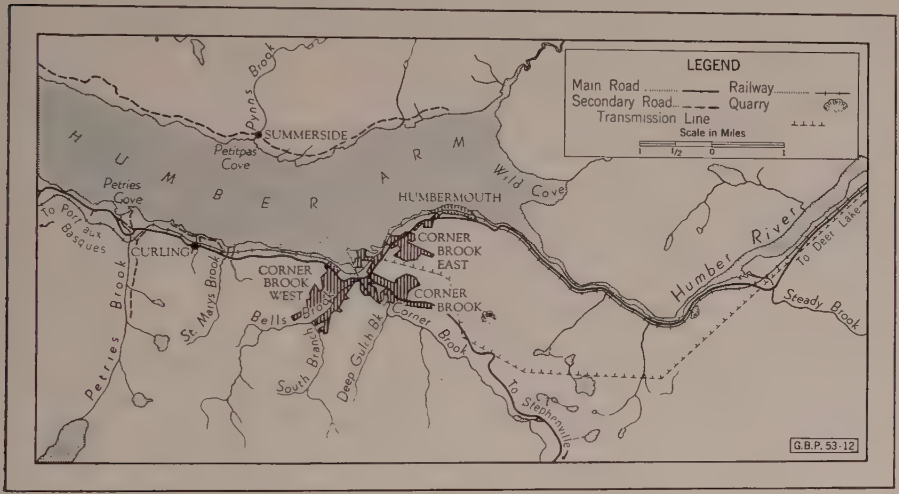

Figure 3. The Corner Brook area and lower Humber River.

CORNER BROOK TOWNSITE

(Population 2,825)

Choice of site for the mill in 1923 appears to have been governed by desire to use Humber River for transportation of pulpwood cut in its drainage basin and by need of rail transportation and hydro-electric power facilities. Deer Lake was considered because it possessed all these requirements, but was discarded in favour of location on Humber Arm. Ocean shipping possibilities of the latter outweighed the lack of local power. Power was developed at Deer Lake and transmitted the 32 intervening miles. On Humber Arm the railway at Humbermouth controlled most of the land at the river mouth. To the west, Curling already was built up considerably, and beyond it the railway swung inland. The site chosen was between these two settled sectors. At the mouth of the Corner Brook the old terraces offered some level land for construction. The brook also provided a good supply of fresh water for the mill and the town that was laid out to serve it.

---

[1] Guardian Associates Ltd.: Corner Brook, 1923–1948; Montreal, 1949, p. 36.

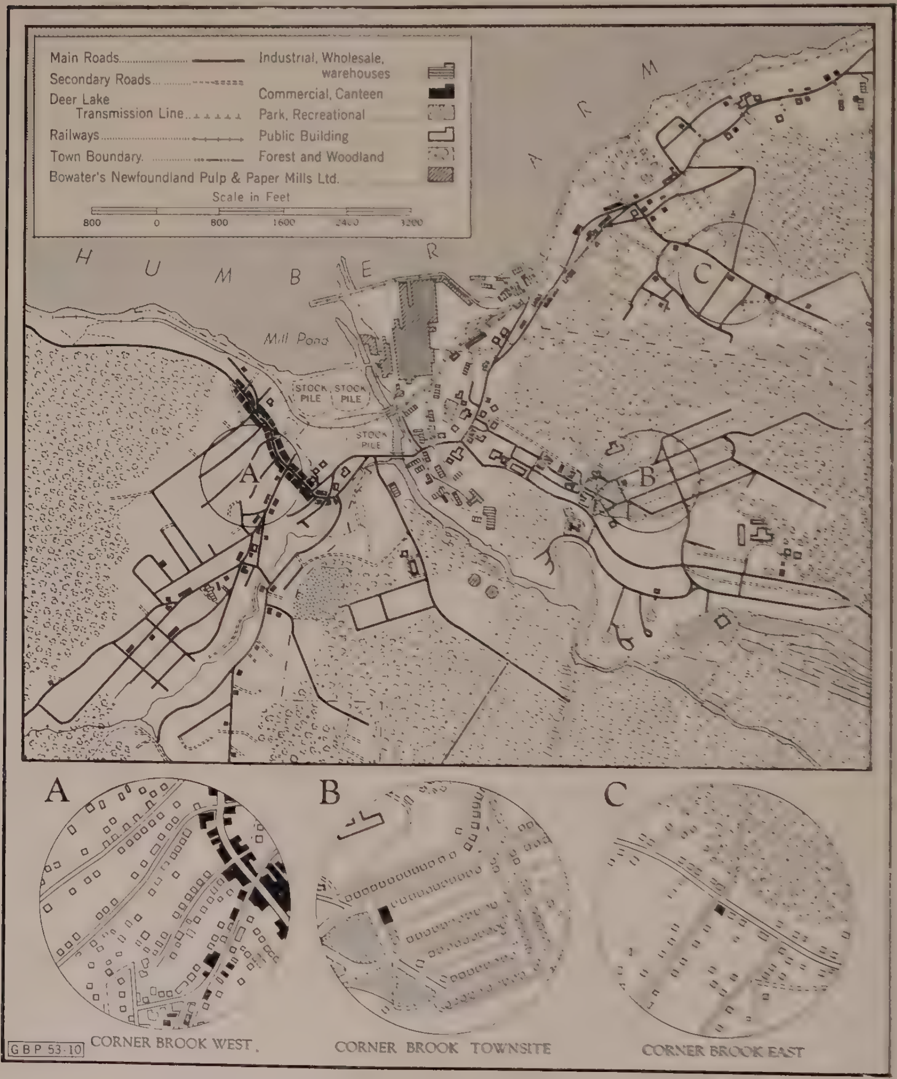

Figure 4. Settlement pattern of Greater Corner Brook.

Most of the 40 acres on which the present mill and pulp piles stand was covered originally by tidewater. Half a million cubic yards of gravel were excavated from the adjacent terrace for fill and thousands of concrete piles were sunk to provide foundations for the mill. At the same time that the mill was being built (1923-1925) and powerhouse facilities being installed at Deer Lake, a town was laid out southeast of the mill along the terrace and in a natural amphitheatre in the general 300-foot bedrock level, half a mile inland and to the east of the brook.

THE TOWN

In the plan of Corner Brook, streets have been laid out in conformity with local relief as much as possible, and the resultant curving lines of paved streets and sidewalks with bordering trees present a very attractive picture. There is a complete absence of any shacks or poor housing types, so that to speak of "A", "B", and "C" class housing is to speak of outstanding, excellent, and good houses.

The northeastern sector of the townsite is restricted for building because of a craggy conglomerate hill rising 150 to 200 feet above the general 50-foot terrace level. The narrow width of the terrace on the north side of the hill overlooking the harbour permits only a single line of C-type houses and commercial establishments on either side of the Humber Road, which parallels the shore and links Corner Brook with the neighbouring communities. Building is also restricted on the west side of the hill, being confined to the terrace between the rocky hill slopes and the 40-foot drop to the present flood plain of Corner Brook. On top of the terrace is West Street, the main avenue in the community, linking the mill site to the north with the main housing area to the south and southeast. At either end are public, social, or commercial buildings. The street is bordered by well-spaced C-type houses, together with church and school and most of the better stores in Townsite. The recently constructed hospital, sanatorium, and mill additions introduced brick, a construction material new to the community. Previously building had been in wood or concrete block.

Housing in the south and southeast of town falls into zones rather readily. Most of the houses in the southeast, in the natural "amphitheatre" are of the C-type—well-painted, neat, "average" frame homes. Nearly all are two-story. A low, partly wooded ridge separates the foregoing sector from the Stephenville Road, along which most of the B-type houses are found. On top of the ridge is the new 300-bed sanatorium to serve the west coast. West of the road, jutting into a bend in Corner Brook and separated from the "B" houses by a wooded gully, is Cobb Lane, along which are the A-type homes set well back on large wooded lots, overlooking the incised brook. In this same sector is the "Viper's Nest", summer residence of Sir Eric Bowater, president of Bowater's, and guest house for special visitors. Immediately to the north, Corner Brook has been

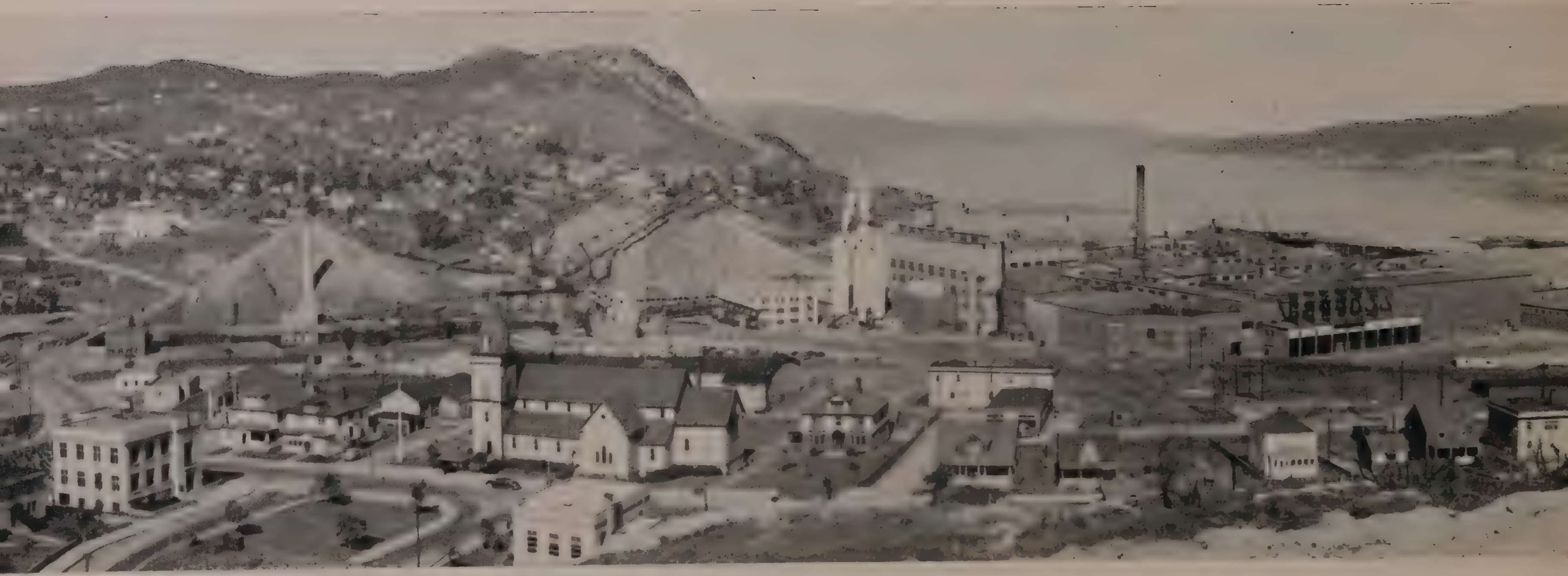

Figure 5. View from the terrace in Corner Brook. Public buildings are at the left and Bowater's Newfoundland Pulp and Paper Mills Limited with the pulpwood stockpiles at right. Blow-Me-Down Mountains in far distance.

dammed, forming a beautiful pond. Overlooking the pond is the Glynmill Inn, and on a secluded promontory beyond the hotel is Corner Brook House, the residence of the general manager of Bowater's. South of the zone of A-type houses is the main recreation area of the town, including the sports field, golf course, and swimming pool, the latter having been constructed in the bottom gorge by erection of a small dam on the brook.

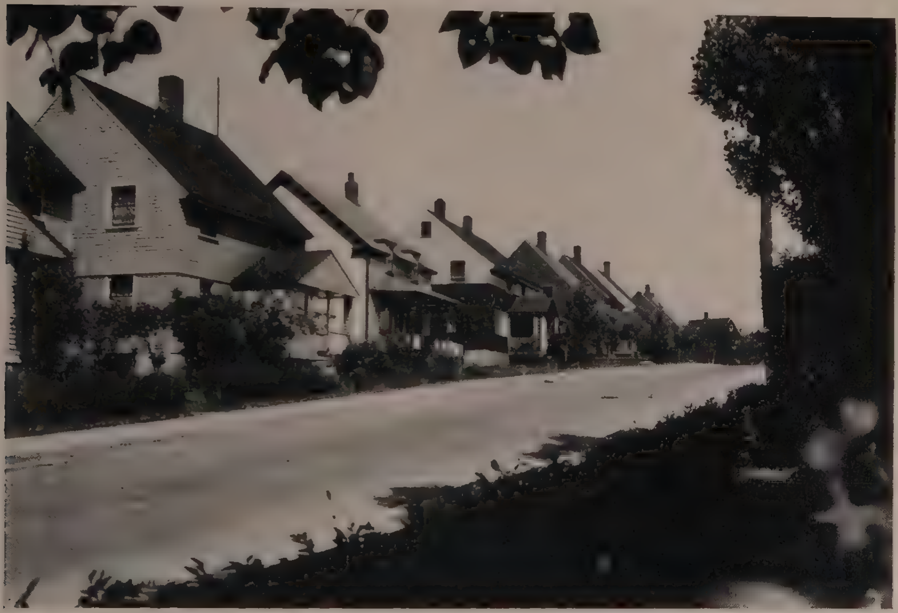

Figure 6. Average workers' homes on a typical street in Corner Brook Townsite.

A great many of the houses (probably two hundred) were built in the first 2 years, when the basic pattern was laid out. Each year more units have been added to the community at about the current rate of twenty to twenty-five, but this number is by no means indicative of the potential rate of growth. In keeping with company policy of encouraging development from a "company town" into an independent town, there is no discrimination against non-company personnel building in Townsite, provided the houses are of a satisfactory type. The aim is to balance company employees and "outsiders" in issuing building permits, to satisfy both groups. Currently house building is going on most rapidly in the southern sectors of town, flanking the road to Stephenville, most houses being of the B-type with considerable variation in style.

Townsite also includes land on the west side of Corner Brook. This explains the sharp lines separating the crowded buildings of Corner Brook West from almost vacant land immediately adjacent, even though the latter usually offers better building sites. Except for the Salvation Army buildings, public school, and Roman Catholic high school, that part of Townsite long remained almost untouched. Recently the only housing co-operative society in Newfoundland started construction of homes there.

Corner Brook is more than a pulp and paper mill with attendant houses. Besides the 500 homes in the town, there are 78 miscellaneous buildings[1] with increasing numbers of diversified businesses. Whereas the shops are concentrated on the terrace, the other commercial and industrial establishments (wholesalers, service industries, foundry) are concentrated on the lowland flats along the lower Corner Brook and at the water's edge.

Much of Corner Brook's increasing importance stems from the fact that it is a seaport. Besides the company's wharves, adjacent to the mill, modern shipping facilities are provided by Western Terminals Limited. In the post-war years the volume of traffic handled has increased greatly, though the uncertain conditions immediately preceding and following union with Canada resulted in a drop in 1949.

TABLE I

Growth of Western Terminals Limited, Corner Brook, Newfoundland[2]

Year	Number of vessels handled	Total cargo handled	Railway cars handled	Labour payroll
		Tons		$
1946	54	24,353	498	60,000
1947	90	58,548	1,257	166,000
1948	145	58,914	1,029	107,000
1949	95	35,866	514	90,000

Corner Brook is regularly linked by sea with Montreal, New York, North Sydney, and Halifax, as well as with other Newfoundland points, and fishing boats, and other unscheduled ships often call.

Considerable amounts of freight are transshipped at the port, both to railway and to coastal steamer, for points as far south as Port aux Basques and around the entire north coast as far east as Gander. Inbound steamships bring general cargo and take away newsprint or herring.

The fact that Corner Brook is a seaport has lowered the local cost of living considerably from what it otherwise would be, but it is still high because the local market is not yet large enough to deal in entire shiploads, as can St. John's. With increasing population and business in the area this problem should decrease. The importance of Corner Brook as a port in comparison with St. John's has increased since union with Canada because of its favourable location in relation to the mainland.

---

[1] Miscellaneous buildings, Corner Brook, 1950: 2 hotels, 6 boarding houses, 5 service stations, 3 taxi stands, 4 restaurants, 4 retail stores, 2 barber shops, 1 drug store, 8 wholesalers, 2 coalyards, 1 foundry, 1 bottling works, 1 dairy, 1 publisher, 1 laundry, 1 ice plant, 1 florist, 1 steamship agent, 1 railway station, 1 liquor store, 1 broadcasting station, 1 telephone company, 2 public buildings, 3 banks, 2 hospitals, 5 schools, 4 churches, 4 rectories and manses, 4 halls, 2 community centres, 2 rinks, 1 theatre; *Source:* Corner Brook Town Offices.

[2] President's Reports, Western Terminals Ltd.

Immediately adjacent to the Western Terminals Limited and Bowater storage sheds and wharves, are the railway yards and buildings of the Canadian National Railways, so that the northeastern shore sector of Corner Brook might be termed the "transportation zone". Railway facilities are hampered by the physical geography of the area. The basic difficulty is that there is only a narrow fringe of land between the edge of the terrace or steeply rising rock shore and the water's edge. To the east there is scarcely room for the railway track alone. At Corner Brook most of the lowland has been made artificially and it is on this that the mill and railway yards have been laid out. More efficient yard layout to handle increasing freight and traffic depends upon obtaining more level ground somehow, probably by cutting back into the terrace, which would necessitate the razing of the buildings standing upon it and the shifting of the main Humber Road.

The western section of Townsite, known locally as "Smithville", consists of the flats adjacent to lower Corner Brook. It is the second area of concentration of business houses other than retail stores. That there are eight wholesale firms located in Corner Brook reflects its importance in Newfoundland commerce. Some were set up locally as new ventures; some were set up by mainland firms to develop the new market area; others were set up as branches of long established St. John's firms. They reflect the increasing importance of Corner Brook both as a local market and as a distribution point for all western Newfoundland. Most firms cover orders from Port aux Basques to Gander, out of Corner Brook. Offices and warehouses are either in the Smithville sector or strategically located between the railway and Western Terminals Limited because of transportation facilities.

The encouraging development of local industries is illustrated by a foundry and a construction company. The foundry was established in 1925 to provide local casting and machine facilities for the new industry. It specializes in castings for paper-mill machinery, and ship, rail, and saw-mill castings. The construction company was only established in 1944, but already has handled over ninety contracts ranging from home building to Bowater's new Little Rapids farm. It has handled projects all over the island, even in St. John's. Electric power for the Corner Brook area is purchased from Bowater's and sold by a private company.

Further emphasizing the increasing diversity of Corner Brook is its importance as a medical centre serving all of the western part of the island of Newfoundland. Besides the 107-bed Western Memorial Hospital, and the 257-bed sanatorium, Corner Brook possesses in its Medical Arts Building, the first organized group clinic in Newfoundland. Corner Brook also has the only dentist on the west coast of Newfoundland. The Canadian National Institute for the Blind also operates a local training school, which serves the west coasts of the province.

THE MILL

Corner Brook was created as a pulp- and paper-mill town, and despite its development and increasing diversification it still is basically a pulp- and paper-mill town. The prosperity of the area is closely tied to the operations of its chief industry. Mill newsprint capacity has been increased greatly. In 1925 it was 400 tons a day and by 1949, 950 tons. A world record for a single day was set in 1949 with an output of 1,010 tons. A sulphite mill was also installed by Bowater's with a capacity of 100 tons a day, increased to 150 tons in 1948. By 1949 its annual capacity was 300,000 tons of newsprint, 55,000 tons of sulphite, and 4,000 tons of groundwood, which made it the largest newsprint mill in the world.

As capacity increased, woods operations had to be expanded to provide the mill with 500,000 cords every year. Transportation of this wood to the mill is a problem. Because of the limited area in which it can be held in Hunter Arm mill pond, just west of the mouth of Corner Brook, it requires careful planning to co-ordinate production and assemblage from timber lands all over the island. Pulpwood arrives in four ways: by natural flow by water; towed by tug; on converted tank landing ships by water; and by railway. The first is the most important. Such wood may have been cut in the Humber basin or up the Northern Peninsula and towed to Hampden, whence it is tracked to the Upper Humber. In the past it has been cut as far east as the company's limits on Gander Lake, towed to Glenwood, and hauled by rail 140 miles to the Grand Lake canal where it was dumped into the Humber waters. This is now unnecessary because of a pulpwood exchange agreement with the Anglo Newfoundland Development Company. From a holding boom at the south end of Deer Lake the pulpwood is allowed to float down the Lower Humber to the mouth where it is again held and towed in booms to the mill pond as needed.

It was always a problem to transport pulpwood to the mill safely by sea from the outside districts as tows often broke loose and scattered in rough weather, and ship transport was costly. This was largely solved in 1949 by chartering four specially converted tank landing ships. These sometimes function as barges towed in a shuttle service by tugs between Corner Brook and the coastal depots from the Northern Peninsula, or from west or south coasts. (Hauls are made from as far as Baie d'Espoir on the south coast.) Carrying 200 cords each, they are loaded and discharged by mechanical cranes, thereby eliminating the costly and laborious hand stowage formerly used in loading the coastal ships. Rail-hauled pulpwood usually comes in from such southern points as Stephenville Crossing and the Codroy Valley.

Limestone for mill operations is available close at hand. Two local quarries utilize the marble associated with the Long Range. The original quarry is located about 4 miles east of Corner Brook in Humber Gorge alongside railway and road. Operations ceased because of possible danger in blasting so close to the transportation lines. A highway maintenance camp now occupies the quarry. Present quarrying is confined to the Dormston Quarry, 1½ miles southeast of Corner Brook on the Stephenville Road. The quarry is located at the base of the prominent 250-foot erosional escarpment. A good road leads 2 miles directly downhill from the quarry to the mill, railway, and docks at Corner Brook. The black marble is of such quality that it has been suggested as suitable building and ornamental stone, but at present its only use is for mill purposes.

Paper storage facilities adjacent to the mills are served by electrical conveyer belts. Immediately alongside the storage sheds, to north and east, are wharves to handle 10,000-ton ships safely with facilities to load at the rate of 2,000 tons daily. Bowater's own ship, the *Corner Brook*, built in 1924, has a capacity of 5,500 tons of newsprint. Ships are now chartered as needed, though the company continues to operate the *Corner Brook*. The year 1950 was a record year for shipping, with 450 vessels clearing port with newsprint for export. Humber Arm freezes about December 26 and clears at the end of April. The first vessel arrives about May 12 and the last leaves about January 1, and during the closed season newsprint is shipped by rail to Port aux Basques where it is exported[1]. The *Corner Brook* is so constructed that it can act as an icebreaker, and usually opens the navigation season, forcing a path through the ice on Humber Arm.

The average number employed in the mill during 1948–49 was 1,800, though during the summer peak the figure rose to 2,091. The seasonal fluctuation is due to the shutting down of the woods yard and shipping during the winter months. The Bowater mill draws the bulk of its workers from outside Corner Book Townsite. As much as 50 per cent of the employees come from Corner Brook West, the remainder from Corner Brook, Corner Brook East, Curling, and a few from Humberside. The distinction between "locals" and "outsiders" is not as sharp as in Grand Falls, largely because Townsite alone cannot provide sufficient mill workers. Being a newer mill, the problem of work for the children of employees is only now beginning to be felt. Of the 200-odd summer jobs around the mill, about 80 are filled by sons of employees.

Total mill production in 1950 was 307,700 tons, and in 1951 was 339,000 tons[2]. Of the latter, 288,700 tons were newsprint, 42,000 tons were sulphite, 6,000 tons were pulping paper, and 3,000 tons were export groundwood. Almost all is exported. Post-war world monetary problems have not been as serious as might be expected because the major outlet for mill production has always been in the United States, almost all the newsprint going to that country before and after Bowater's took over management.

---

[1] In 1950 "rail movement was begun (February 6) in anticipation of the annual freeze-up and the closing of the Bay of Islands by gulf ice. As a result of the extraordinarily mild winter experienced, the freeze-up did not materialize and with the exception of a thin ice coating, which was easily disposed of by the icebreaker chartered for this purpose, the port was ice free and open to shipping throughout the winter, the first time that this has happened since the mills were established". Rail shipments ended February 29, by which time 6,790 tons of newsprint and 4,902 tons of sulphite had been handled; Nfld. Jnl. Comm., vol. XIX (1), January 1952, p. 47.

[2] Nfld. Jnl. Comm., vol. XIX (1), January 1952, p. 47.

CORNER BROOK WEST

(Population 6,831)

Corner Brook West is one of two tributary communities that developed on either side of Corner Brook Townsite with the coming of the pulp and paper mill. In many ways it is similar to the relationship of Windsor to Grand Falls, except that the Bowater's mill, drawing 50 per cent of its workers from Corner Brook West, is far more dependent upon the neighbouring community than is the mill at Grand Falls.

The site is not favourable for the development of building. A small area of deltaic terrace exists within the town limits but soon disappears in the steep rocky slopes that extend to the shore immediately west of the town. Better land, including much of the terrace on the west side of Lower Corner Brook, is included within Townsite boundaries, and except for the co-operative housing project and a few schools, is largely unused. Most of Corner Brook West has been forced up the rocky slopes to the southwest to elevations of 500 feet in places.

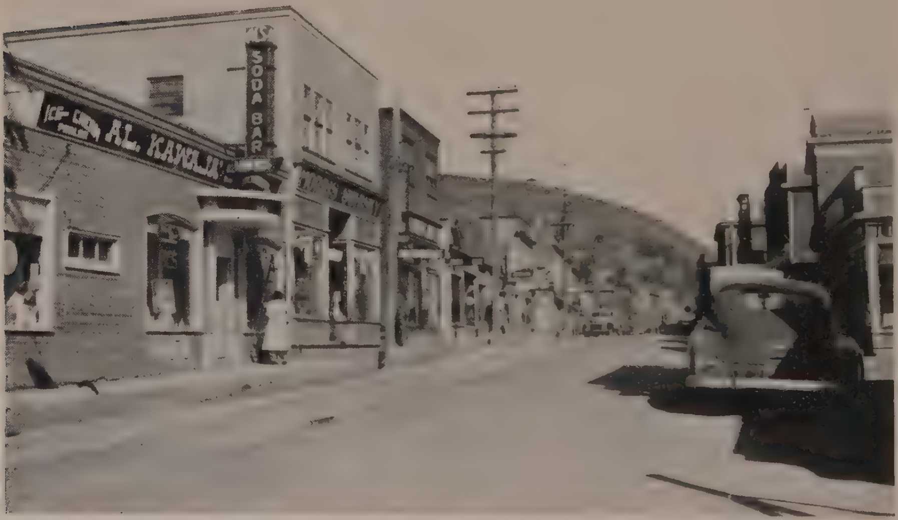

Figure 7. Broadway, in Corner Brook West. Note false fronts on stores at right.

In the growth of this community there has been a complete absence of planning or control. This was partly a reflection of the inability of the paper company to provide sufficient housing and associated services in Townsite for all its employees as the mill grew rapidly. Partly this was a reflection of the not uncommon desire of many workers to own their own homes in areas where they would not have to pay taxes. Partly also it was a reflection of the attraction of the new settlement for part-time workers.

Corner Brook West possesses the most important shopping centre in the Corner Brook area. Most of the businesses are situated on the terrace along Broadway, the main street, which forms part of the main road linking Corner Brook and the communities to the west. The frame stores and halls, some with false fronts, that line the street are rather reminiscent of frontier towns of the West. There is a wide range of store types, although most numerous are the clothing stores, most of which are on Broadway. Some of these businesses function as wholesale houses for stores in smaller outlying west coast settlements, as well as local retail outlets. The chief reason for the predominance of Corner Brook West as the major shopping centre for the area would seem to be that land was available without restrictions. Stores of all types, sizes, and shapes accordingly were built at the point closest to the mill, and along the main road, to take advantage of the traffic.

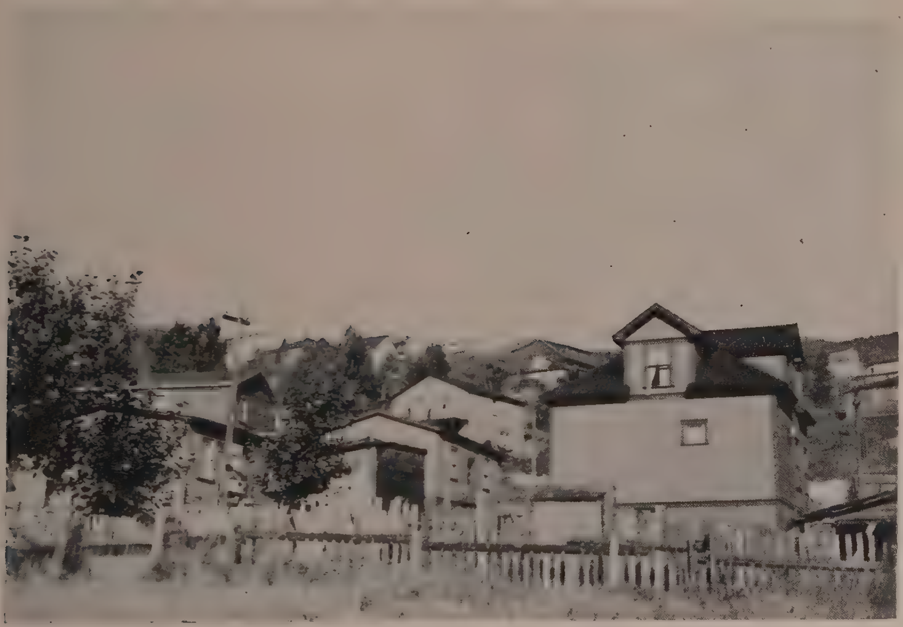

Figure 8. Uncontrolled building climbs the rocky slopes of Corner Brook West. Until recent incorporation, there was no check on this type of development, and it has created serious problems for service facilities and road construction and maintenance.

Though the "commercial core" is fairly well defined along Broadway, there is no plan to the rest of the settlement. Houses were built so that there is overcrowding in some places, where people tried to locate as close as possible to the mill, and considerable areas of unused land in others. Some houses have been erected adjacent to Broadway, where they are close to stores and transportation. These have the disadvantage that they are built on very steep slopes. Other houses have been built along the flood plain and valley slopes of Bells Brook, some at elevations of 500 feet. Most of the 981 dwellings are cottages or shacks, but scattered among them are some better two-story homes. The latter are mainly those of store-owners and most are near Broadway, though there is a tendency for the more successful merchants to build modern homes in Townsite when possible. Numerous canteens[1] are scattered through the settlement, and there is a suggestion of a second commercial street developing along Caribou Road near Broadway.

There is only one industry in Corner Brook West—a woodworking mill. The company, starting as a small sawmill in 1936 with only four employees, has become one of the largest industries of the west coast, with a payroll sometimes exceeding two hundred. The mill has expanded into related lines, with a modern woodworking plant producing finished furniture and turning out builders' supplies. During World War II the mill supplied much of the lumber for the U.S.A.F. base at Stephenville. The mill has expanded to the point where its site is not satisfactory. Space is limited, with built-up property all around, and there is no direct access to rail, sea, or main highway. Lumber is brought in by the company's own schooner from the northwest coast and Cape Breton Island. It is landed 3½ miles away at Curling because there is no public wharf in Corner Brook (Bowater's property cuts off Corner Brook West from Humber Arm), and then is trucked the remaining distance to the mill.

CORNER BROOK EAST

(Population 3,445)

No pronounced break separates the built-up parts of Townsite from Corner Brook East in the way that Corner Brook tends to isolate Corner Brook West. The relief of the land has helped to separate them in places, but the two communities are continuous along the Humber Road, where the boundary between them is artificial. Similarly, to the east, the boundary line between Corner Brook East and Humbermouth is entirely artificial. Containing 690 acres, this community has been termed "suburban"[2] in comparison with urban Corner Brook West.

The site consists essentially of a flat-topped hill at an elevation of 300 to 350 feet, dropping about 100 feet into the ampitheatre-like valley to the south and descending abruptly to Humber Arm on the north. No stream valley or terrace exists to break the latter slope, so that though the hill-top lends itself to building the bayside slopes do not.

Corner Brook East, like Corner Brook West, came into existence with the pulp and paper mill, and for similar reasons. Unlike the latter, the stores, with one or two exceptions, have remained smaller in size and number (there are 60 retail stores in all), so that commercial activity is limited and occupies only a small percentage of the population. Though some families in the eastern parts derive their income from the railway, the population is almost completely dependent upon the operation of the mill. Of fifty families on one road, only four do not derive their income from Bowater's[1].

---

[1] The term "canteen" in Newfoundland refers to a small refreshment stand that may or may not carry a few basic grocery or clothing items. It is often operated on a part-time basis.

[2] Goldberg, H. Carl: Report on Municipal Administration and Services in the Greater Corner Brook Area of Newfoundland; Montreal, 1950.

Above the railway that skirts the shore, the main Humber Road extends across, and in places is notched into, the steep hill slopes to Humbermouth to the east. The houses of those who wanted to or had to build outside Townsite extended along this road. Also along Humber Road are the churches and schools, and along the same road almost all the stores were erected. The latter are most numerous in the western sector immediately adjoining company land, but serve local needs only. The widening and rerouting of Humber Road in the western sections cut off several of these stores.

Houses were also erected along side roads, some of which were extended to the upland surface. In general, there has not been the same congestion that characterizes much of Corner Brook West, though the problem is present in the built-up parts of the hill slopes above Humber Road. On the upland (known locally as "Humber Heights") the houses are mostly well spaced, usually with gardens around them; so that there is a more suburban atmosphere. The houses are mainly fair to poor, frame, two-story or cottage types with some larger, better homes among them. The shack element in the community, though present, is not as large as in Corner Brook West.

The oldest industry in town is a planing mill located at the easternmost limits of the town on the Humber Road. Its own schooner brings in rough lumber from the northwest coast, unloading at a small wharf below the store. The electrically operated mill has an output of 6,000 feet a day of finished lumber and also turns out sashes, frames, and doors. Recently, a cement plant and gypsum products factory have been established, based on local deposits of limestone and gypsum.

Incorporation of the two settlements of Corner Brook West and East was long delayed. In 1942 the western satellite, in 1948 the eastern one, became municipalities, providing some of the basic services. The major problems facing the municipalities are legacies of their early years when there was no orderly planning of settlement, no requirements for lot size, road allowance, sewage disposal, and so forth. In both settlements the steepness of the narrow original roads, almost impassable by car, creates a traffic problem. In both there are congested areas that present fire and sanitation hazards. Nevertheless, improvements are constantly being effected, so that in future Greater Corner Brook should grow more uniformly. This should reduce the incongruities in conditions that have characterized the local urban geography to the present.

---

[1] Rodgers, E., Clerk of the Corner Brook East Council, July 24, 1950.

HUMBERMOUTH

(Population 1,225)

Humbermouth, an unincorporated municipality with over 1,200 inhabitants, extends from the mouth of Humber River at Brake Cove a mile westward to the artificial boundary line separating it from Corner Brook East. It differs from the other communities in that it is primarily a railway town.

Locally, the steep shores of Corner Brook East give way to a more gradual uniform descent from the 300-foot elevation, with some level land near the shore. When this site was chosen for the railway workshops and roundhouse to serve the Western Division in 1896, Riverhead, as it was then known, became the second most important settlement on Humber Arm, being surpassed only by Curling. It was the divisional point between the Bishop's Falls and the Port aux Basques Subdivisions. It was also the connecting point with the railway coastal steamships serving the northwest coasts and Labrador.

The growth of the pulp and paper mill communities to the west has affected Humbermouth in many ways. It lost its relative predominance as a population centre, and even some of its former railway functions. Coastal steamship connections are now made at Corner Brook and the former wharf is abandoned. Even the 20 to 30 minute engine-changing stopovers now take place at Corner Brook, with only a 5-minute stop at Humbermouth. Despite these changes, Humbermouth is still a railway town, probably more so than any other community in the island, with the bulk of the inhabitants employed in the local machine and repair shops, in the running trades, or on maintenance in the division. Some people are employed at Bowater's, often the children of railway employees, just as some of the sons participate in the autumn herring fishery, but the relative percentage is very small compared with those deriving their income from the railway.

Houses have been built along two major axes—the railway and the road immediately south of it, and along the main Humber Road farther back up the slope. A few side roads or lines have developed but they are of little significance. Most of the houses have been constructed near the railway, so that there is undesirable congestion in some places. Most of the newer houses have been built along the Humber Road, but building has been haphazard and if allowed to continue unguided may prove a handicap in the future.

There is no marked zonation of houses; the settlement is still at an immature stage of development. Most houses are of the cottage type, with larger houses near the railway station. There are considerable numbers of shacks, notably in the central sector, and in the eastern limits between the railway and the water's edge. The two or three large stores are opposite the station and post office, which function as the principal focus of the community. Apart from a few small wharves and sheds on Brake Point, which are used by some part-time fishermen, the waterfront is unused, with only remnants of the former railway steamship wharves near the station.

CURLING

(Population 3,559)

Curling is probably the oldest settlement on the Bay of Islands and one of the oldest in western Newfoundland. It is believed to date from 1780–90. Not only is it old in history, but the tempo of living is slower and more rural in character than that of the other towns of the Corner Brook area. The town is much less dependent upon the pulp and paper mill, and is still primarily a fishermen's settlement.

As the seat of the first British magistrate on the west coast, Birchy Cove (the original name of the settlement) acquired considerable importance. From the first, the community was primarily a fishing settlement based largely upon herring, and it became the major centre in Newfoundland for that fishery. Even though Humbermouth was chosen over Curling as the railway centre, primarily because the railway could reach the water's edge there and Curling lacked harbour facilities for handling the railway steamships, the latter remained the major centre and the original church, school, and banking facilities of the region were located there.

With the coming of the pulp and paper mill to Corner Brook, that centre displaced Curling as the major west coast settlement. The seat of the magistrate for the Humber District was shifted to Corner Brook. The semi-weekly newspaper *The Western Star* (western Newfoundland's only newspaper), established in Curling in 1900, similarly shifted its headquarters. However, the mill also provided additional employment so that Curling continued to grow. It is estimated that currently about 30 per cent of the men in the community are permanently employed by Bowater's[1]. The remainder are seasonal workers, primarily fishermen both in the Bay of Islands and on the Labrador[2], but also engaged in pulpwood cutting and some farming-gardening. The town is subject to greater instability in its economy than the rest of the Corner Brook area because of the seasonal nature of the fishery and fish-packing industries and the yearly fluctuations in catch.

THE TOWN

Curling is a sprawling community extending over 3 miles along Humber Arm and covering 13½ square miles, of which about 3 square miles is built up. From elevations of 500 feet and over at a distance of about half a mile inland, the land drops down locally in a fairly uniform wooded slope. Four or five brooks have notched their courses across the slope. The largest is Petries Brook, in the west, with a rather open valley. In the western sectors, too, are some areas of local fluvial and marine terraces at 50 to

---

[1] Candow, A. J., Town Manager of Curling, July 28, 1950.

[2] There are over 100 fishing boats of various types at Curling.

100 foot elevations. In the east the upland approaches much closer to the bay, to which it drops in a modified cliff slope in the Crow Gulch sector. The 500-feet high white sandstone and conglomerate crags of the latter sector overlooking Greater Corner Brook to the east, and the steeply dipping shales and massive limestones of 625-feet high Mount Moriah in the west, are the most prominent local relief features. The shore is slightly scalloped and is developed mainly in till, with bedrock forming several small promontories.

The town consists of several clusters of settlement that have merged more or less into one, but with local names surviving. In the west is Mount Moriah. East of it around the main cove is Petries (named after an early settler) and Petries Crossing where the railway crosses the main Humber Road. Over a rocky rise to the east is Curling proper, and east of that and separated from it by a wooded, unused section of land between O'Rourke and St. Mary's Brooks, is Curling East. The latter is in turn separated from Corner Brook West by about a mile of unused land in the area of steep slopes. The original settlement seems to have been made in the western sectors, around Petries Cove, and then extended eastward.

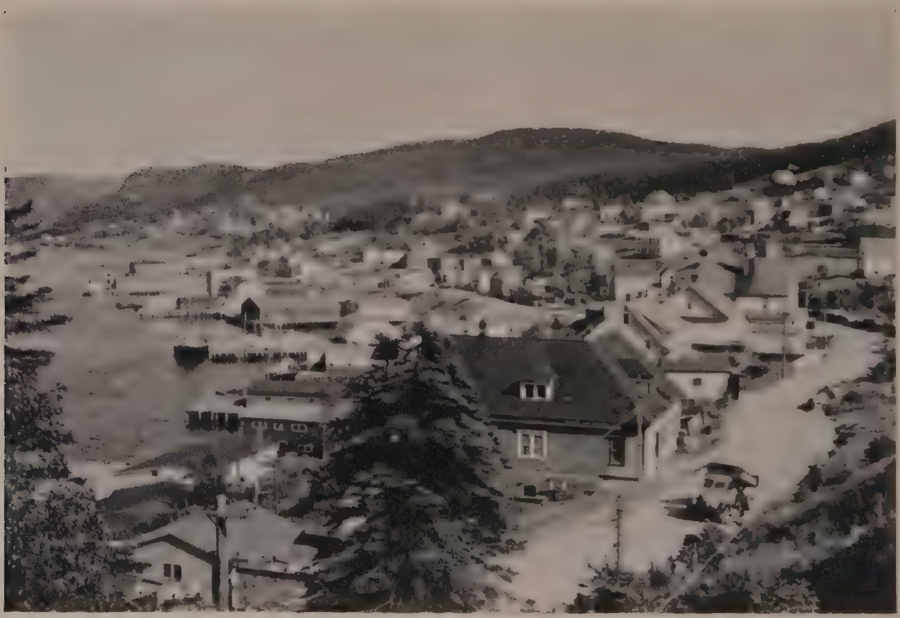

Figure 9. Looking east along Water Street over the main waterfront sector of Curling. The larger herring factories lining the water's edge represent the heart of the important Bay of Islands herring fishery.

The sprawling nature of the settlement in contrast with the more compact pattern of Corner Brook and its satellite towns, reflects the origin of Curling. The fishermen generally erected their homes on a long, single street paralleling the shore, with sufficient land for a garden and pasture or hayfield for an animal or two. The dominant pattern is one of scattered buildings roughly alined along one or two axes, usually the main Humber Road or the railway, trending east-west along the shore. Apart from a few short crossroads, the only appreciable north-south extension to the community is along the valley of Petries Brook, and to a lesser degree along that of Conway Brook. The only place where there is any congestion is in the main waterfront sector, and even there it is not as serious as in Corner Brook West.

The houses are predominantly frame cottages or two-story buildings, mostly kept in good repair and well painted, so that there is a general trimness about the community that is not met in the others except in Corner Brook Townsite. Often a small barn to store hay is on the holding, except on the smaller lots of Curling proper. Shacks form a very small percentage of the local housing types and are scattered. A few small herring factories and a small sawmill fringe Petries Cove. At the Crossing, where the railway crosses the main Humber Road and the principal side road branches off, a half dozen stores form the only commercial cluster in the western part of the settlement.

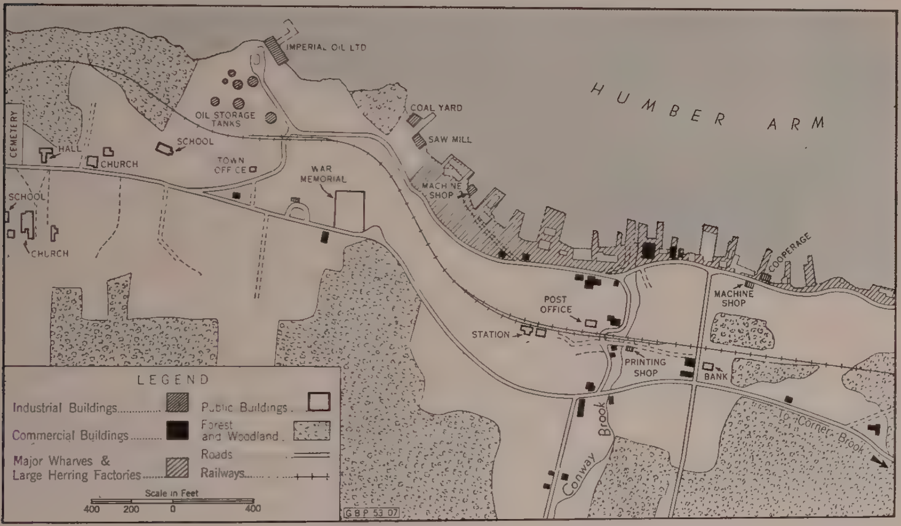

Figure 10. Settlement pattern of part of Curling.

Along the next shallow shore indentation to the east, for about half a mile, are the bulk of the Curling herring factories and warehouses. It is around this "Water Street" on which they are located that the economic life of Curling rotates. Most of the retail stores in Curling have located in this general area, together with such other businesses as the theatre, bank, and printing shop. In this area also are included many large homes overlooking the waterfront, generally belonging to the leading merchants and owners of the larger herring factories.

The other major feature of the Curling waterfront is the marine terminal of Imperial Oil Limited, immediately west of the main herring factory sector, between the rocky promontories on which stand the churches and the war memorial. Besides the wharf, buildings, and garages, eight storage tanks with a total capacity of 2,599,000 gallons are set into the rocky hillside. Tank ships bring in bulk products from the Halifax refinery, and from Curling it is sent out by track and railway tank car to smaller dealers from Port aux Basques to Howley. Three hundred and fifty thousand gallons a month are handled on the average, of which about half is used in the Corner Brook area. Though the site of the terminal is satisfactory for ships, grades are rather steep from the shore to the main highroad for the tank trucks, so a pipe-line was installed to the Humber Road to free trucks from the difficult climb in winter.

Curling was incorporated in 1947. Services provided are still very limited, mainly garbage collection, road construction and maintenance, and building and sanitary inspection. A town water supply and sewerage system are at present (1953) being installed. Roads are steep and narrow in many sectors. A significant fact is that real property was not taxed until recently. This was largely a reflection of the traditional dislike of the fisherman to pay taxes on his home. Although the towns of Greater Corner Brook include people with such a background, they are new towns and opposition is not as cohesive as in Curling with its long history where the individual's property rights are regarded as almost sacred. The results, geographically, are a rather interrupted town pattern, in which certain lands are unused for personal reasons.

THE FISHERY

Though the Bay of Islands, Humber Arm, and Curling always have figured prominently in the Newfoundland herring fishery, there have been significant changes. The United States, and particularly New York city, usually have been the major market. In the early days, under their treaty rights, American fishing vessels depended largely on local fishermen for bait and frequently for taking fish. The catch was shipped out as bulk cargoes lightly salted down and frozen by the cold weather of late autumn and early winter. At the close of World War I, local factories, specializing in Scotch cure, started and drove the American bulk fleet from the area. Now only one American firm continues to send one or two vessels.

The herring fishery usually begins in October, ends in May, and the last of the season's pack is shipped out by late June. The peak of the run usually comes from mid-November to the end of the first week in January. Much of the fishing is done outside the immediate area within a radius of 20 miles, and the catch is taken to the factories by collector boats belonging to the factory owners. Fishing continues during the winter even though parts of the Bay of Islands may be frozen over. During the 1949–50 winter, a "herring road" was cut through the bush to connect fishermen on Middle Arm with the Curling plants. When properly snow-packed, snowmobiles and sleds use it to bring herring to Humber Arm where trucks transport the fish over the ice to the southern side.

The secondary industries in Curling include herring factories, with a large number of closely associated businesses such as warehouses, machine shops (marine engine repairs), cooperages, and a salt store. The collecting, packing, and shipping of the annual Bay of Islands herring fishery normally provides a large revenue to the local inhabitants, but the industry, unfortunately, may vary considerably from year to year; this partly because the schools of herring do not always appear in the same fishing areas each year. During the fishing seasons of 1945–46 and 1946–47, practically no herring were caught in Notre Dame Bay, whereas very large schools were found in the Bay of Islands. The Newfoundland herring fishing has not been good the last 2 or 3 years. In 1949–50 only 5,998 barrels of Scotch cure were packed, and only 4,145 barrels in 1950–51[1], compared with 20,316 barrels in 1945–46 and 21,265 barrels in 1946–47. One of the principal reasons for the recent decline was that the fish went under the ice both in Fortune Bay and Bay of Islands in the best packing time. Local output has also been affected by fluctuations in market demands and availability of steady employment elsewhere at good wages[2]. The total export of saltbulk and pickled herring from the Bay of Islands in 1945–46 was 32,689,725 pounds; this dropped to 5,147,400 pounds in 1948–49, with marked effect on the local economy. Former low returns, often resulting from price-cutting wars, now have been eliminated by government control, and the Newfoundland Fisheries Board now handles all marketing.

Of the fifteen herring factories in Curling, about ten are large, with a normal output capacity of 3,000 barrels. The operators of some of the larger factories are also important general merchants (both retail and wholesale), often advancing credit to people with whom they are connected in the herring fishery. Much of this business comes from the small outlying communities on the Bay of Islands, and schooners and motorboats come in from as far as 20 miles for provisions and supplies from Curling. The rise of Corner Brook, despite the greater variety of its more modern stores, has not affected this trade much because the Curling factory owner-merchant will advance credit. Also, there is no free public wharfage at Corner Brook, whereas the small craft have the free use of the Curling docks. Even rough lumber for the Corner Brook West planing mill comes in by schooner at Curling.

In 1947 a herring cannery was opened on Petries Point. The operating season is dependent upon ice-free conditions in the Bay of Islands, so that it averages from early April through May and June to the first week of July. Then the herring disappear until October or November, when operations begin again and continue until freeze-up in mid-January. Not enough fish are winter-caught to supply the cannery. At peak operations the cannery employs 80 men and women, but work is seasonal and sporadic. Marketed mainly in the United States and mainland Canada, the produce is sent out in ships of the parent Nova Scotian Company.

---

[1] Gushue, R.: Newfoundland Fisheries in 1951; Nfld. Jnl. Comm., vol. XIX (1), January 1952, p. 58.

[2] Ibid.

Because of decreased supply of herring, some lobster and salmon were handled in 1949–50, but the machinery is not designed for it and the season is short. Local canneries find it difficult to supply their plants, largely because of the high prices paid for live lobsters. Salmon is good but there is the difficulty of entering into competition with other producing areas. Codfish offer another alternative; they are plentiful, but usually wormy, and require properly trained help in packing.

In addition to the local fishery, over thirty men from Curling go to the Labrador shore fishery[1], which usually begins in June, with salmon being taken from the end of June to the end of July, then cod, and finally herring. The fishermen return home about the first of October in time for the local herring fishery. Because there was no cod fishery to speak of, "on the Labrador" during 1950, most fishermen returned home early. The majority are becoming increasingly dissatisfied with the industry because of the constant gamble involved and many are turning to other sources of employment.

The Newfoundland Fisheries Board is now convinced that a halibut channel exists offshore in this part of the island, and wants to encourage its development because it yields a high-priced product. The major difficulty is that it would require improved fishing equipment with new and larger boats and better gear. The installation of a quick-freeze plant in the Bay of Islands district would also be necessary. In late 1951 the government authorized construction of a local cold storage plant for herring to ensure a continuous supply of that fish for processing plants, with 30 per cent of the plant's facilities reserved for public use[2]. The plant will also store herring to supply bait depots and should greatly help the local industry. Hence, the fishery in which Curling is so vitally concerned, though the oldest economic activity of the Corner Brook area, is still in process of change.

FARMING IN THE CORNER BROOK AREA

In the general development of the Corner Brook area, many problems are emerging. As the area becomes more urban, it becomes less self sufficient, particularly in agricultural produce. The individual small garden plot still is very common, but is becoming less so. Only recently has there been any real attempt made to meet the demand for such produce. On the outskirts of Corner Brook West there are a few small farms, mostly producing dairy products. Bowater's has tried to encourage farming, first at the 100-acre Dormston Farm on the outskirts of Corner Brook on the Stephenville Road. When much of that was incorporated into the town golf course and there was little room for expansion, the company farm was shifted to Little Rapids, about 10 miles east in the Humber Valley. There the 600 acres of farm land include the alluvial lands at the foot of steep hills rising on either side of Humber River. Two hundred and fifty acres were cleared in 1950 (further clearings have been made annually since), of which 30 acres were in oats and 20 in kale. The latter crop was tried first in 1947 as winter ensilage, and when mixed with molasses proved so successful that the acreage has been increased each year. The remaining land is in summer pasture. Each day 250 gallons of milk are shipped to Corner Brook. A recently opened dairy in Townsite supplies the area with pasteurized milk, and ice cream for the west coast, previously shipped from St. John's, is now distributed from Corner Brook.

---

[1] With favourable weather and travelling continuously, the trip to the Labrador fishery in such small vessels usually takes about a day and a half.

[2] Nfld. Jnl. Comm. ,vol. XVIII (12), December 1951, p. 34.

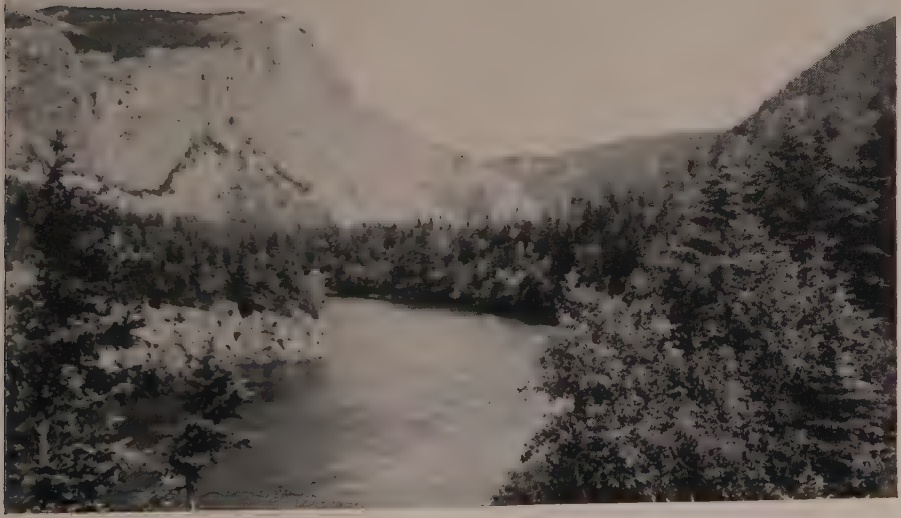

Figure 11. Humber Gorge, where Humber River cuts through the Long Range Mountains, ranks among the foremost beauty spots of Newfoundland.

The Humber Valley is one of the better-endowed agricultural areas in Newfoundland. Production need not be restricted to hay and pasture, or to potato, turnip, and cabbage crops. Promise of development of truck farming is found at Dormston Farm, which now operates as a truck garden. During the summer of 1950, 15 acres were cultivated, and besides the usual Newfoundland crops set forth above, lettuce, spinach, pumpkins, squash, vegetable marrow, broad beans, carrots, and chard were raised. True, the local soil, except in the Humber Valley proper, tends to be patchy, occurring in pockets; but the climate is not unfavourable. In the old settlement of Curling, even fruit trees such as apple, plum, and cherry have yielded well. Although the district has the advantage of a growing market, it has faced increased competition from the mainland since union with Canada.

RECREATION

Mention should be made of the recreational value of the lower Humber Valley near the Corner Brook area. The gorge of Humber River, where it cuts through the Long Range, is one of the spectacular beauty spots of Newfoundland, ranking with Lomond and Bonne Bay as the best in all the western part of the island. Paralleling the river are the excellent Humber Road and the Newfoundland Railway, leading to Deer Lake. Besides the natural beauty of the area, including an attractive hanging waterfall where Steady Brook drops into the gorge, the Humber offers excellent salmon fishing. Corner Brook is fortunate in having such a recreation area close at hand, not only to attract visitors but to serve local inhabitants. As the town expands it will prove still more valuable. Even now there are several summer cottages along its upper parts.

CONCLUSION

It is now generally recognized that most of the municipal problems involved in the Corner Brook area concern all three settlements. They arise from an uneven development of an area that despite an underlying unity has had sufficient variety to cause real differences. Development in each community has been geared only to its local needs, but those needs are now merging, with their growing interdependence. Further development is restricted by the lack of an adequate water supply and a sewage disposal system, and is hampered by the difficulties involved in providing fire protection and road construction and maintenance. Modern demands are outstripping early facilities. For instance, Corner Brook has a relatively great number of automobiles. This means heavy wear and tear on the existing, limited road facilities, and popular demand for their improvement. Yet haphazard building in the past has resulted in "roads" over difficult grades, which are almost impossible to maintain.

The major difficulty is to make a new adjustment to the local geography, taking into account the needs of the area as a whole. Townsite has outgrown the company town stage and Bowater's has been active in promoting diversification of industry, private ownership, and the "community spirit". It is stated that the company would like to retire from the municipal field and concentrate on newsprint production, and is encouraging amalgamation between the several centres as a means of integrating the greater community. Thus the trend now seems to be to use and concentrate on those elements of geography that give coherence to the greater area; to overcome still remaining geographical barriers or hazards; and so prepare a physical and an economic basis for wider social and administrative co-operation.

RÉSUMÉ

La région de Corner Brook, après celle de St. John's, est la région la plus peuplée de la province de Terre-Neuve. Son expansion et son développement rapide sont dus en grande partie à l'industrie de la pâte à papier et du papier et à l'importance grandissante de la côte ouest de l'île.

La région étudiée ici s'étend sur une distance de cinq milles vers l'ouest, depuis l'embouchure de la rivière Humber, en longeant la rive sud de la baie Humber jusqu'à l'anse Petries, et sur une distance de 2 milles à l'intérieur. Parmi les principaux facteurs physiques on note le bras de mer de la Humber, creusé par les glaciers, possédant quelques bons mouillages pour navires, des terraces glaciaires et des pentes escarpées qui limitent la construction.

Une brève introduction historique précède la description de la région telle qu'elle nous apparaît aujourd'hui. Celle-ci groupe cinq centres habités, soit Humbermouth, Corner Brook East, Corner Brook, Corner Brook West et Curling. On décrit et explique le site, la situation, l'organisation et l'économie de base de chacun de ces centres, et l'influence directe qu'a exercée l'industrie de la pâte à papier et du papier sur leur développement. Quelques notes sur l'agriculture locale, sur les avantages touristiques de la vallée inférieure de la Humber et sur les problèmes municipaux de la région complètent cette étude.

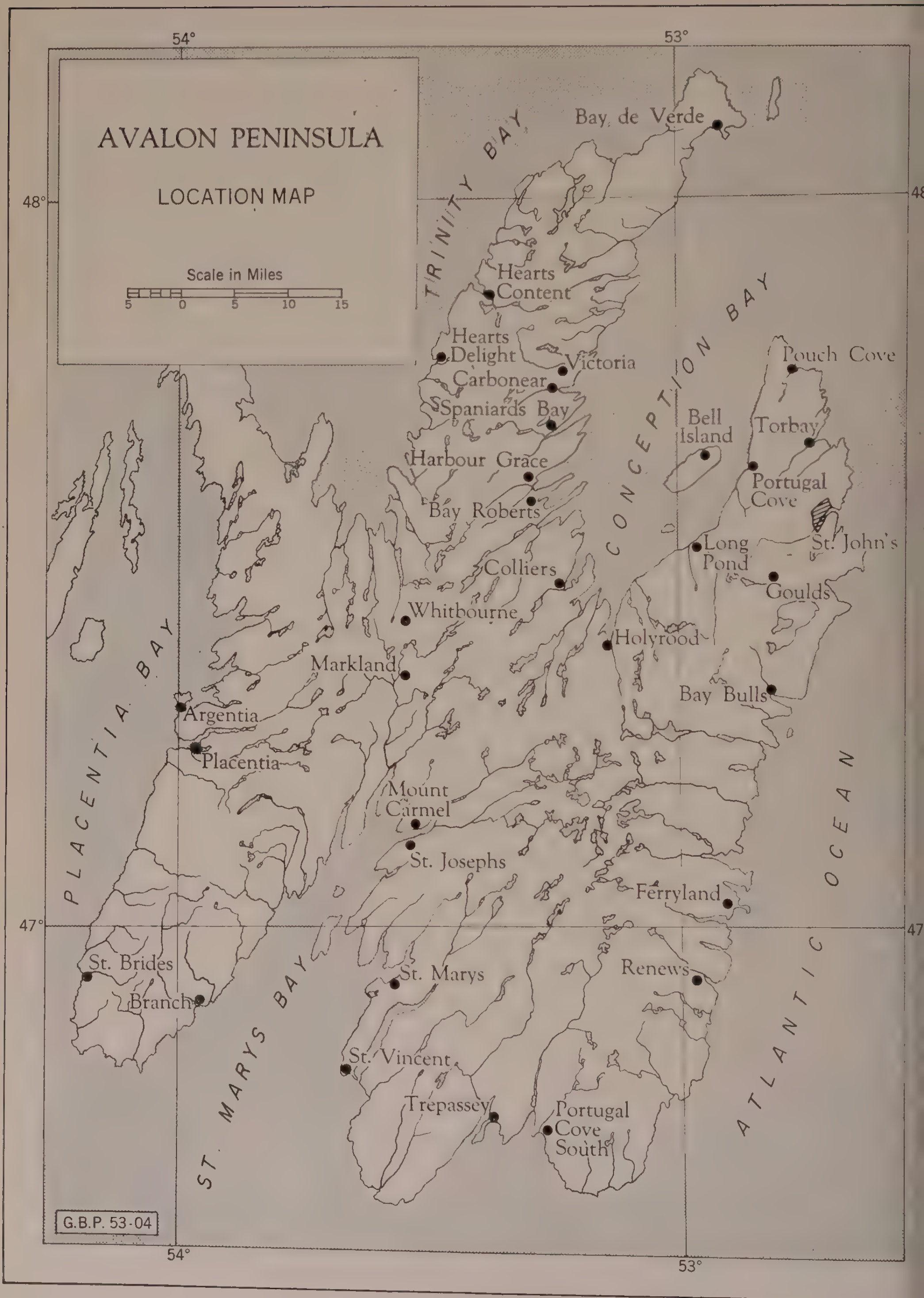
AVALON PENINSULA
LOCATION MAP
Scale in Miles
5
0
5
10
15
54°
53°
48°
47°
TRINITY BAY
CONCEPTION BAY
PLACENTIA BAY
ST. MARYS BAY
ATLANTIC OCEAN
Bay de Verde
Hearts Content
Hearts Delight
Victoria
Carbonear
Spaniards Bay
Harbour Grace
Bay Roberts
Colliers
Whitbourne
Markland
Argentia
Placentia
Holyrood
Bell Island
Pouch Cove
Torbay
Portugal Cove
St. John's
Long Pond
Goulds
Bay Bulls
Mount Carmel
St. Josephs
Ferryland
Renews
St. Brides
Branch
St. Marys
St. Vincent
Trepassey
Portugal Cove South
G.B.P. 53-04

Figure 1.

LAND CLASSIFICATION AS PART OF A GEOGRAPHICAL SURVEY OF THE AVALON PENINSULA OF NEWFOUNDLAND

Lloyd G. Reeds[1]

Land classification is prerequisite to any program of the development of resources. Many sciences are concerned with the problem, and none more than geography. For, in making a geographical survey of any region one starts with a description of the land, proceeds to a record of its use, and concludes with an appraisal of how land use is related to land type.

In recent years numerous systems for classifying land have been devised by the World Land Use Survey of the International Geographical Union; by the Land Classification Committee of the Pan-American Institute of Geography; by the United States Conservation Service[2]; by the Tennessee Valley Authority; by the geographical survey known as the Land Utilization Survey of Great Britain[3]; by the Ontario Department of Planning and Development; and by many other services employing geographers[4]. The object of this paper is to present a criticial discussion of the three types of land classification utilized in a study of the geography of the Avalon Peninsula, the most southeasterly part of the province of Newfoundland and the most easterly part of Canada (Figure 1).

At the outset, it is essential to describe briefly the general geography of the region under investigation, including the physiography, climate, and soils, as an understanding of these elements of the environment is important in any study of land utilization.

PHYSICAL GEOGRAPHY

The Avalon Peninsula is built chiefly of Precambrian rocks. Small areas of Cambrian and Ordovician sediments lie on the Precambrian and are mostly distributed around the bays that cut deeply into the shore. The Precambrian consists of a thick series of volcanics and sediments that has been intruded by granites of both Precambrian and Palæozoic Age. The Cambrian and Ordovician rocks occur as patches around Trinity, Conception, St. Mary's, and Placentia Bays and are doubtless in part responsible for the location of these bays, as these rocks are much more readily eroded than the Precambrian[1]. The present distribution of the Cambrian and Ordovician results in part from faulting and in part from the preservation of these rocks in wide synclines.

---

[1] Lloyd Reeds, B.A., M.A., Toronto, Associate Professor of Geography, McMaster University. Leader of Geographical Branch party to Newfoundland, 1950.

[2] Land Classification in the United States; National Resources Planning Board, March 1941, Washington, D.C.

[3] Stamp, L. Dudley (ed.): The Land of Britain. The Report of the Land Utilization Survey of Britain; London, Geographical Publications Ltd., in nine volumes.

[4] For references to various Canadian and United States Classification reports *See:*

Putnam, D. F.: Pedogeography of Canada; Geog. Bull. No. 1, 1951, pp. 57–85.

Veatch, J. O.: Agricultural Land Classification and Land Types of Michigan; Special Bull. 231; Michigan State College, 1941.

Bedrock in many sections of the Avalon determines the topography. There is also a close relationship between bedrock, drainage, and soil development. The topography is that of a dissected upland varying from 350 to 700 feet above sea-level. The Avalon has three erosional surfaces. The lowest is around 200 feet and is gently rolling. The second is 350 to 450 feet above sea-level and is shown in very gently rolling uplands that seem to compose most of the peninsula. The highest is 700 to 800 feet above sea-level and is preserved only on the highest parts of the peninsula as the South Hills of St. John's. Monadnocks rise in places above this level up to 1,200 feet. The landscape has been modified and made irregular by glaciation. There are innumerable lakes, ponds, and bogs interspersed with rocky ridges and polished rock knolls. Hills displaying pronounced lee and stoss slopes are very common, but a mantle of glacial drift occupies much of the area between the rock ridges. The large bays have been over-deepened by glaciation and are thus fiords. Glacial materials are of two main types, outwash or drift and till. Well-stratified kame and delta materials are not as common but were noted at several places in the Avalon.

The Avalon Peninsula lies within the humid, continental, microthermal climatic region. Winters are long and cold and summers are short and cool, the mean January temperature at St. John's being 23°F. and the July temperature 59°F. The Avalon Peninsula in summer is dominated by modified polar continental air. The relative humidity is generally low and the nights are cool. Fog is common along the coast but rarely penetrates far inland[2]. The climate is not suited to the production of a great variety of field crops. It is most favourable for forest growth and grass. Potatoes, cabbage, and hay are the main cultivated crops. Spring grain is grown for fodder but does not mature well because of the short growing season and low summer temperatures.

The soils of the Avalon Peninsula are youthful podzols developed on Wisconsin glacial materials. Under the influence of a humid microthermal climate with its associated coniferous forest vegetation, podzolization has been the dominant soil-forming process. Everywhere on well-drained sites, there is a well-developed A_2 or leached horizon. Most of the soils are developed on glacial outwash materials or till. The soil profile usually is shallow and varies from 5 to 18 inches.

The humid climate (54 inches precipitation at St. John's) is favourable to the accumulation of organic matter on the surface, as the summer season is not long or warm enough to permit its destruction. Accumulations of peat vary in depth in accordance with topography and drainage.

---

[1] Betts, P. M.: Bibliography of the Geology of Newfoundland; St. Johns, 1936.

[2] Hare, F. K.: The Climate of the Island of Newfoundland; Geog. Bull. No. 2, 1952, pp. 36–88.

In spite of slope, and a moist climate, soil erosion though evident is not a serious problem in the Avalon Peninsula. The porous nature of the parent materials, the infrequent occurrence of torrential rain, and the limited extent of intensive cultivation has reduced the loss of top soil.

The lack of inherent fertility in the soil, together with its excessive stoniness and shallowness are the factors that create difficulties in the development of the land for agricultural purposes.

The chemical analysis of samples has indicated that most soils are very low in nitrogen, very low in phosphorus, low in potassium and calcium, low to medium in magnesium, and very high in aluminium content. Organic matter content ranges from 6 to 10 per cent with Ph values varying from 4·0 to 5·5[1].

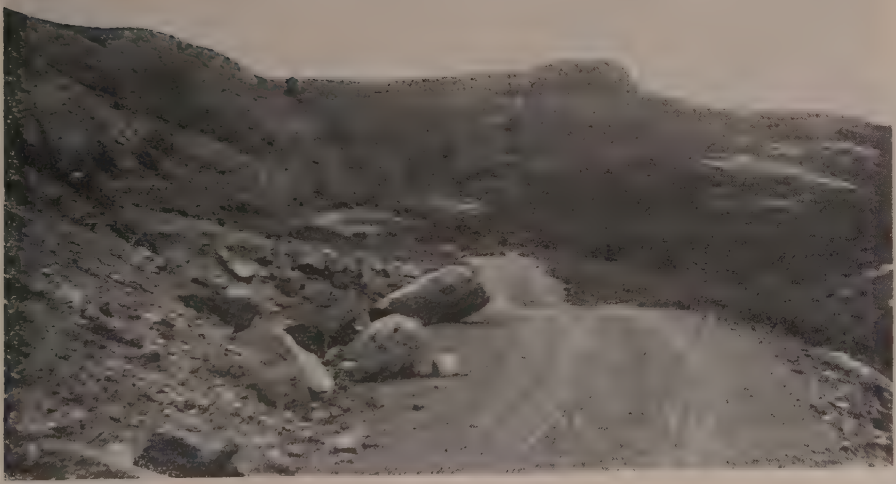

Figure 2. Eroded banks of shallow till west of Turks Gut Long Pond (northwest of Colliers). Barren lands.

THE WORLD LAND USE CLASSIFICATION

At the 16th International Geographical Congress, held at Lisbon in April 1949, a commission was set up to investigate the possibility of carrying out a land use survey on a world basis. The commission, supported by UNESCO, met in the following December and issued a report that outlined the need for and objectives of such a survey and that contains a "master key" of land use categories[2]. There have been many objective

---

[1] Soil samples analysed by Soils Division, Department of Agriculture, St. John's.

[2] There have been several short accounts of this published. *See* for example:
Callow, J.: The World Land Use Survey; Geography, vol. XXXVI, No. 4, pp. 231–234 (Nov. 1951).
Van Valkenburg, S.: The World Land Use Survey; Economic Geography, vol. 26, No. 1, pp. 1–5 (Jan. 1950).

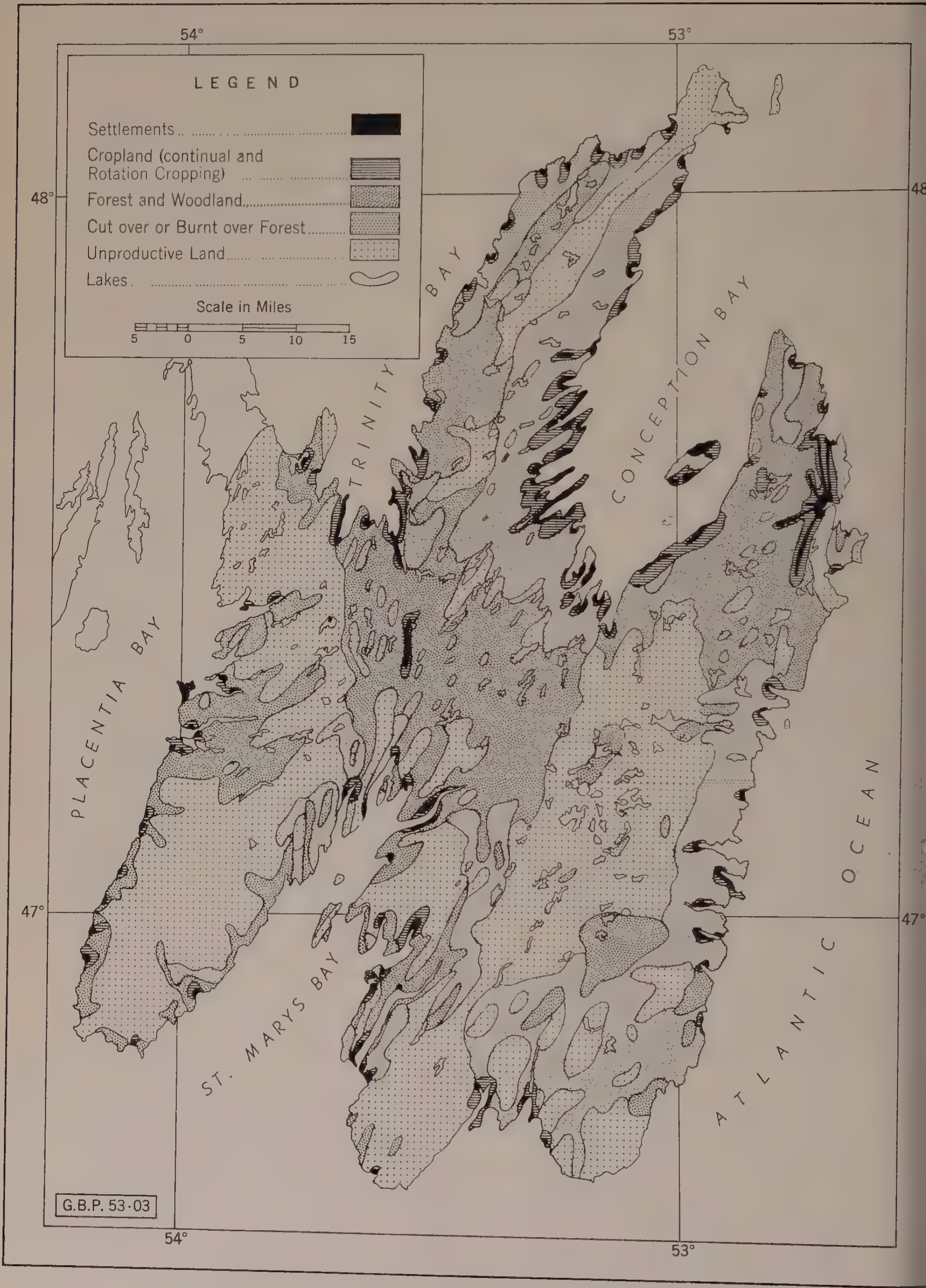

Figure 3. Land use map of Avalon Peninsula according to the World Land Use Survey System. The scale is approximately 1:1M.

studies of land use carried out in many parts of the world but these have not been related to each other and have not had any uniform system of classification. This has resulted mainly from the fact that they have been highly specialized surveys. Agriculturists have classified land according to economic value, crop production, or soil fertility, but have rarely interested themselves in non-agricultural land. Foresters have classified non-agricultural land in terms of its usefulness for tree growth, but have never concerned themselves with non-rural land. City planners classify non-rural land in a variety of ways, but stop at the frontiers of the city or, at most, at those of its region. Only a geographer tries to classify all types of land because only he is concerned with all types and with how they are related to each other in the total environment.

The World Land Use Survey was aware of this and sought to create a system that would represent all land classes in a single classification, and that would, therefore, present a view of a region as a whole, in all its connectedness. It tried to classify land according to existing conditions as developed in the region, not as it might be or ought to be developed. It recommended a system that would be strictly factual and objective, the results of which should be published in the form of maps and explanatory memoirs.

The main categories of the classification are: (1) settlements and associated non-agricultural land (dark and light red); (2) horticulture (deep purple); (3) tree and other perennial crops (light purple): (4) cropland, (*a*) continual and rotation cropping (dark brown), (*b*) land rotation (light brown); (5) improved permanent pasture (light green); (6) unimproved grazing land (orange and yellow); (7) woodlands (in six categories) (different shades of green); (8) swamps and marshes (blue); (9) unproductive land (grey).

Land use was mapped according to this system in the Avalon Peninsula during the 1950 field season. It was found that five of the nine categories were applicable to this area. The initial plotting was done on a rough base map on a scale of 3,300 feet to 1 inch that had been prepared from mosaics of aerial photos of this scale. The individual aerial photographs were examined under the stereoscope. The proposed colour scheme was adopted in the preparation of the map. Field checks were carried out during the reconnaissance survey of the peninsula. The data on the 1 inch to 1 mile maps were then transferred to a map on a scale of 5 miles to 1 inch. This was further reduced to the scale of 1:1,000,000, which is the suggested scale for the World Land Use Survey.

Much detail was necessarily lost as repeated reductions and generalizations were made, but the final map presents a fairly accurate picture of the present land use pattern (Figure 3). The following categories were recognized in the area under investigation: (1) settlement; (4) cropland, (*a*) continual and rotation; (7) woodlands, (*a*) dense, (*e*) cut-over and burnt-over; (9) unproductive land.

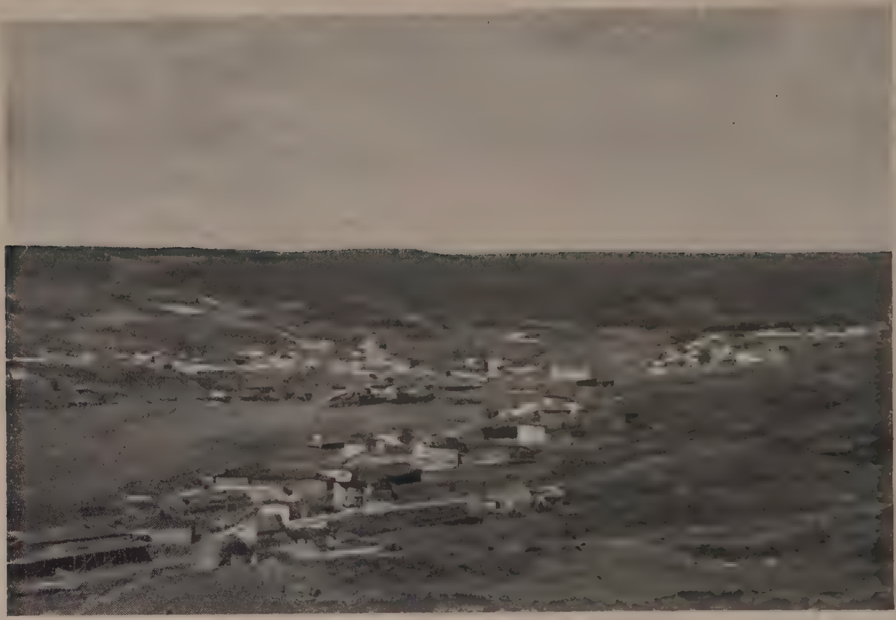

Figure 4. Bay Bulls from northeast—a typical fishing village and associated cropland (*See* Figure 3).

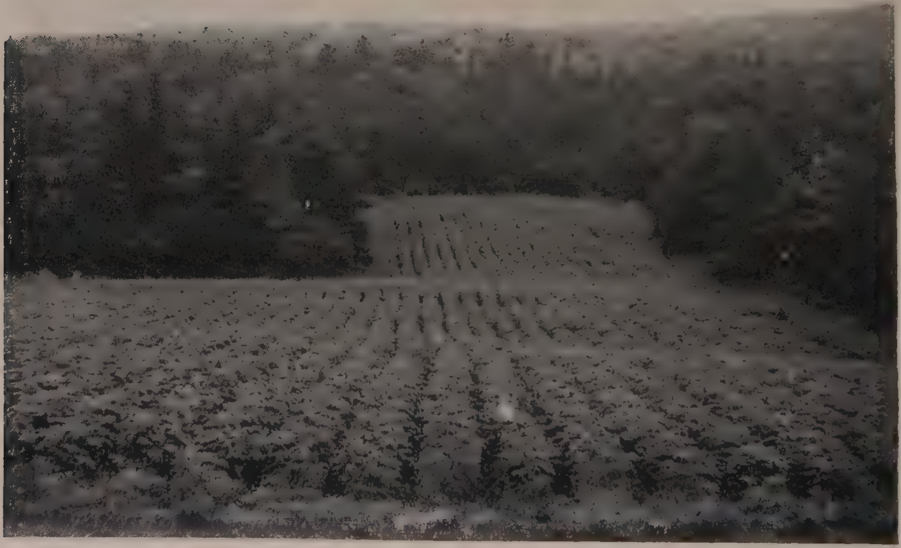

Figure 5. A fine crop of potatoes west of St. John's. The patchy distribution of this type of land use made cartographic representation difficult.

Type 1 (settlement and associated non-agricultural lands). The method for showing this type was found appropriate, though the use of light red to represent it was omitted. The small size of most of the settlements and consequent negligible amount of land that would be represented by this colour made its inclusion impracticable.

The pattern of settlement in the Avalon Peninsula is unique. The predominating occupation of shore fishing has resulted in dispersed coastal settlement with villages of usually less than 1,000 inhabitants clustering about the small inlets. Thus settlement on the Land Use map is for the most part represented by a red line around the various capes and along the shores. This line may perhaps give a somewhat exaggerated impression of the density of population. On the other hand, the use of red dots for each group of houses though perhaps more accurate would make the plotting much more difficult.

Tree crops as described under type 3 are very rare in the Avalon Peninsula as only a few apple and cherry trees are kept in private gardens. Thus this type has not been mapped for the area.

Type 4 (includes (*a*) continual and rotation cropping and (*b*) land rotation). The chief field crops in Newfoundland include hay, oats, and vegetables. Land rotation as defined under sub-heading (*b*) is not employed and thus only dark brown colouring is used to represent type 4. The patchy distribution of cultivated land made the cartographic representation of this type difficult. Moreover, the colour used fails to show up on the map, particularly where it comes up against dark green for the forest. In fact, reading a world land use map in this locality would give the impression that pasture land was the most highly developed—because the most graphically represented—in the area. The agricultural land is hard to recognize.

In part this is due to the nature of the land. Commercial crops of any large extent are found in only a few localities. A major proportion of cropland exists in small holdings, which are generally the property of fishermen-farmers. These lands are utilized mainly to produce garden vegetables or as pasture lands for dairy cows, sheep, and goats. Each house is surrounded by a few acres or less of cleared land that is divided into garden crops, and thus the band of dark brown that has been drawn around the red line of settlement may not always be exactly accurate but is about the only means of portraying the extent of cropland on maps of this scale.

Horticulture as described in the classification under type 2 is rare in the Avalon Peninsula and land use of this type is included under type 4.

On some of the dairy farms around the city of St. John's there is improved permanent pasture as described in type 5 of the classification. However, the total areal extent is not sufficiently large to permit plotting on these maps. In the Avalon Peninsula most animals are fenced out to forage at large in the woods, on the bogs, on the barrens, or along the roadside[1]. The extent of unimproved grazing land as described in type 6 of the classification would require more exhaustive field research before it could be mapped properly. As has been already stated, there are considerable numbers of animals that are grazed on barren or burnt-over areas, in the woods, or on the bogs. However, these grazing lands are seldom far from settled areas, and nowhere is the animal population very large. No attempt, therefore, has been made to represent this category.

Most of the areas shown as unproductive or as burnt-over land could be utilized for grazing purposes, and thus perhaps some of the grey and stippled green areas should be shown in orange or yellow. Much research needs to be done to determine the carrying capacity of these unproductive and burnt-over lands. At the present time it may be assumed, however, that a considerably larger population could be supported in these areas that are not being used for any particular purpose.

Type 7 of the classification does not allow for differentiations between coniferous and deciduous trees. Yet this distinction is important. Presumably in a system meant for the world as a whole not much attention can be paid to tree species. However, in a region like the Avalon Peninsula, it is not so much the density of tree growth that forms a clue to the physical condition of the land, although that is important, as the species of trees. Coniferous woodland is found on rather acidic, poorly drained, thin till; deciduous woodland on deeper, better drained, less podzolized till. Therefore, these classes have more geographical significance as indicators of the nature, as well as the value, of surface deposits, than the simple classes proposed by the world land use survey.

Also, the category of height might seem more effective than density in describing the woodland. Nearly all coniferous woodland is dense in the sense of having the crowns of the trees touching. Where trees grow so widely apart as not to touch, the *woodland* aspect of the vegetation gives way to coniferous *scrub*. Moreover, what the commercial interests are concerned with is tall, dense woodland. If the classification can be modified to include these interests without in any way sacrificing any scientific merit, it ought perhaps to be done.

The forests of the Avalon Peninsula are for the most part of the dense coniferous type and for this reason a dark green colouring has been used to represent them. It is not always possible to map accurately the areas that have been burnt over or cut over recently, but in general the areas covered by green dots represent this aspect. Some of the barren or unproductive lands may also be burnt-over forest land where tree growth is recovering at a very slow rate.

There are no extensive swamps or marshes in the Avalon Peninsula though the area covered by bog is quite large. The World Land Use classification has not included a category for bogs, and for this reason they have been grouped with the unproductive land. In a sense the bogs are not entirely unproductive as they are of some slight use for grazing and at the same time produce a great variety of edible berries. Were the cranberry industry, based on bogs, ever to become as important in this region as in similar environments, then it would be useful to be able to distinguish bog from unproductive land.

---

[1] Summers, W. F.: The Geography of the Avalon Peninsula; unpublished M.A. Thesis, McGill University.

The barren rocky highlands and coastal headlands as well as extensive tracts of bog have been included in type 9 category. Strictly speaking, even the barren rocky areas are not entirely unproductive as in many instances they do produce some blueberries and strawberries. However, the surface appears barren for the most part and these areas are essentially unproductive land.

The World Land Use classification provides a fairly satisfactory method of mapping the existing pattern of land use in the Avalon Peninsula. It has been found from this experiment with the system that much of the work can be accomplished through the interpretation of aerial photographs. The writer hastens to point out, however, that this work should be done by one who has some first hand acquaintance with the area being studied. Then, too, the work of aerial photograph interpretation should be preceded by a general field reconnaissance, at which time photographs may be checked on the scene and ground photos taken to act as a key for further interpretation in the office. One week with a vehicle was sufficient to complete this type of reconnaissance for the Avalon Peninsula. The additional office work required occupied one experienced observer another 3 weeks.

It has also been shown by this experiment that it is best to plot the data first on a base map of the same scale as the aerial photographs being used. It was found that the data from this map could be transferred to maps on the scale of 1:1,000,000. This scale permits satisfactory presentation of the generalized existing pattern of land use. It is recommended that this series of maps (i.e., 1:1,000,000) should have a full legend explaining the generalizations that have been adopted, and that the maps should not be published without accompanying explanatory memoirs.

The amplifications that appear necessary to improve this system for this part of the world include the following:

1. Some clarification of 7 (*a*), i.e., this statement would not appear to include dense coniferous forest.
2. An expansion of type 8 to allow for peat bogs, which are so common throughout sub-arctic and northern glaciated regions.
3. Type 4 (*b*) needs to be clarified.
4. The delineation of unimproved grazing land becomes a problem in such underdeveloped and extensively utilized areas of the world as parts of Newfoundland.

Such an inventory as this is the first step toward ascertaining the required factual knowledge regarding the use of land throughout the world. It is important in carrying out the survey that an objective and uniform record of land use facts be made on maps of the same scale.

This pilot survey in Newfoundland has shown that provided base maps, aerial photographs, and suitable personnel are available, this project can be accomplished in a fairly short period of time and at a reasonable cost. It has shown that considerable generalization is necessary in the production of a map on the scale of 1:1,000,000, though the inaccuracy is not so great as to detract too much from the value of the map. It has demonstrated that the World Land Use survey is both feasible and useful. When completed it should prove of vital importance in the study of world problems of population and food supply. However, it could be argued that when it comes to the actual development programs or readjustment of agricultural land use practices in individual countries, a more detailed investigation of the physical qualities of the land itself is of even greater significance than the production of a land use map.

The land use map, of itself, says little about the land. It is true a trained geographer will know that certain uses commonly go with certain conditions of land. But he only knows this by studying the land where the patterns of land use with which he is familiar occur.

In some countries it is possible to take the land use map and compare it with topographic, geologic, soil, farm type, and population maps on the same scale. No doubt in such cases an accurate relationship may be drawn between land use and slope, drainage, bedrock, surface deposits and soil types, agricultural practices, and the intensity of settlement of the region. But there are many parts of the world, such as the Avalon Peninsula, for which few if any of these additional maps exist. In such areas it might be better for the geographer to make something more than a land use map. He might prepare a land type map, that is, a record of types of land as identified both according to *use* and to *form*. Such a map would not only show *how* the land was used but would indicate *why* it was used that way, in so far as geography could supply the explanation.

LAND TYPE-LAND USE SURVEY METHOD

This system attempts to combine a generalized physical classification of the land with the present use. It was developed and employed in the St. John's Peninsula, the Whitbourne area, and the Carbonear area. The symbols were plotted on aerial photographs of three different scales, 3,300, 800, and 200 feet to 1 inch. The experiment revealed that satisfactory plotting can be carried out with the 3,300 feet to 1 inch photograph as a base map and that this scale is the most suitable for mapping extensive areas (Figure 6). The 200 feet to 1 inch photograph is ideal for detailed farm studies and for mapping urban land use.

This system is essentially a field technique worked out for recording on a map some of the most significant aspects of the natural qualities of the land and its present use[1]. The resultant map should be regarded as a field map only, from which may be produced a series of single factor maps, including the natural land type, a slope map, a map of drainage conditions, a present land use map, and perhaps a recommended land use map. Indeed, that is one of the chief values of the land type map; from it, several other maps of the various physical characteristics of the land can be drawn with reasonable accuracy.

---

[1] Scarcely anything has been written about this method, though the Conservation Branch of the Ontario Department of Planning and Development has employed a somewhat similar scheme, which has been described in several reports.

A boundary is drawn in the field or in the laboratory under a stereoscope where any one of the physical factors or any particular use of the land appears to vary (Figure 7). It thus reveals on an aerial basis any variation noted in the parent materials, the soil type, the slope, the drainage conditions, or the present use. Often the map emphasizes relationships between

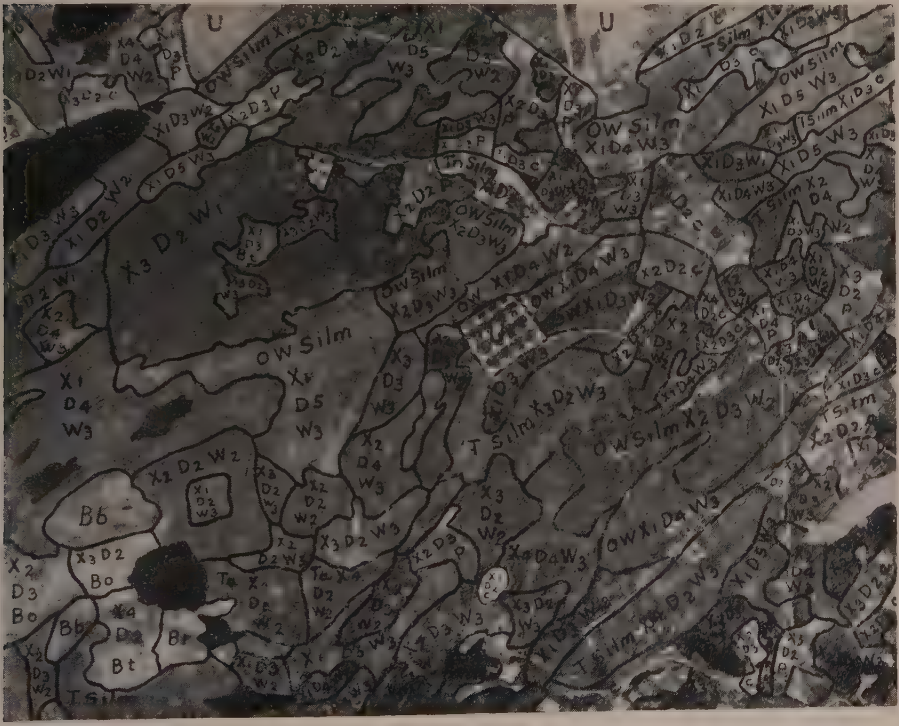

Figure 6. The Land Type-Land Use Survey method applied to an area northeast of St. John's.

the use of the land, erosion, and the various physical characteristics. It is also extremely valuable in the planning of future uses for the land. For example, it may indicate that there are large trees growing on 15 per cent slopes and excessively stony soils. It is fairly obvious that this type of land should remain forested. On the other hand, there may be areas of good forests on gentle, well-drained slopes, which could very well be cleared for agricultural use. In the Avalon Peninsula, and especially in the St. John's region, there is an urgent need for an increase in the acreage of pasture and hay. This map then provides an invaluable guide to those who are concerned with the problem of land clearance and drainage.

It should be pointed out that the production of an accurate map of this type requires much time, especially if a correct interpretation of soil conditions is to be recorded. As a chorologic scheme for classifying soils, it is not very satisfactory, but it is, nevertheless, a most useful means of recording variations in the physical features and present use of the land.

LAND TYPE-LAND USE CLASSIFICATION

Soil

(a) *Origin of Parent Materials*

Till — T
Kame — K
Lacustrine — L
Outwash — OW
Bottom lands — BL
If shallow — a

(b) *Texture*

Gravel — G
Sand — S
Loam — Lm
Silt loam — Silm
Clay loam— Clm
Silty clay — Sicl
Clay — Cl

(c) *Stoniness of Surface Soil*

n — few stones
n′ — moderately stony
n′′ — very stony

(d) *Slope*

X_1 = 0-2 per cent
X_2 = 2-5 "
X_3 = 5-15 "
X_4 = 15-30 "
X_5 = > 30 "

(e) *Drainage*

D_1 = excessive
D_2 = good
D_3 = moderate
D_4 = imperfect
D_5 = poor

Present Land Use

(a) *Woodland*

Wo — burnt over
Wc — cut over recently
W_1 — commercial growth
W_2 — smaller dense growth
W_3 — scrubby or stunted small growth
W_4 — alder
W_{10} — large trees but scattered
W_{20} — scattered smaller trees
W_{30} — open W_3
W_{40} — scattered W_4

(b) *Barren Lands*

Bt — barren 12 inch till
Bta — barren shallow till
Br — barren rocky site
Bb — barren bog (depth of peat estimated)
Bo — burnt over rocky land
Bow — barren outwash
Bowa — barren shallow outwash
Bk — barren kame
g — being grazed

(c) *Agricultural Lands*

Co — newly cleared land
C — cropland — Ch — hay
Coa — oats for fodder
Cpo — potatoes
Cv — vegetables
Cg — small garden
P — pasture — Pn — natural pasture, never ploughed but arable
Pr – very rough pasture—non-arable
Pc — pasture in rotation

(d) *Urban Land*—U

Includes fishing villages, airports, etc.

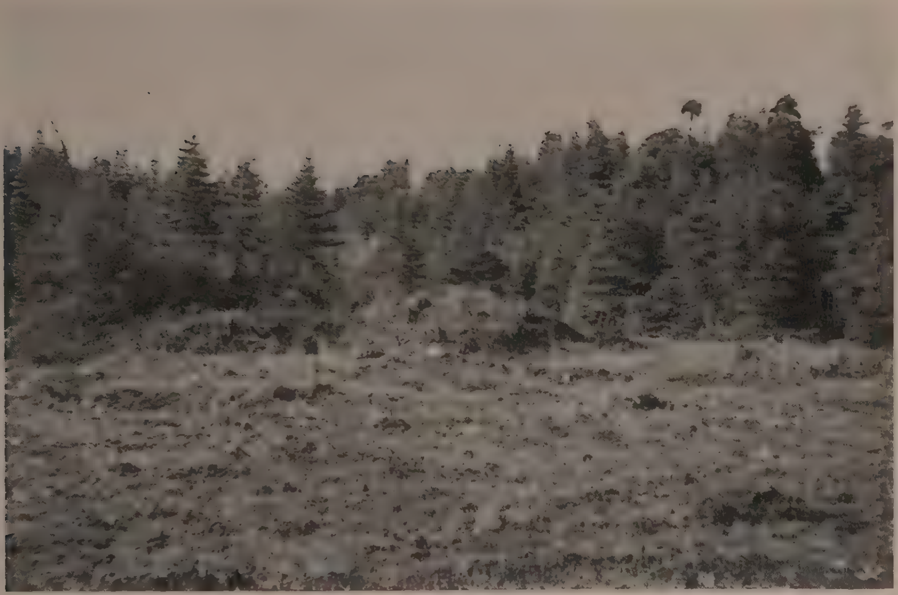

Figure 7. Bog and W_2 woodland merging into W_1 on western outskirts of St. John's.

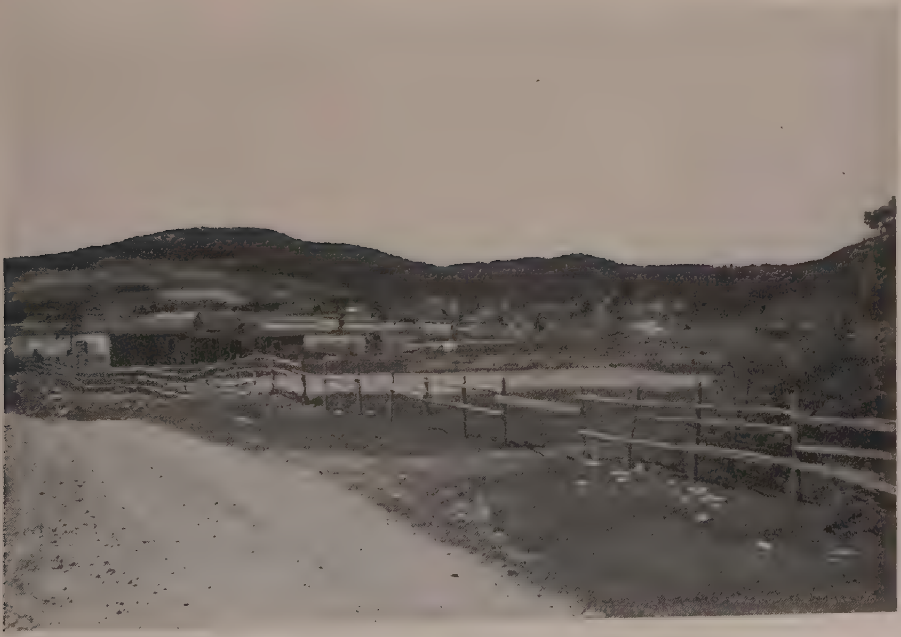

Figure 8. Cropland in the St. John's peninsula. The soils here are excessively stony. The land in the foreground was mapped as TSilm X_2 D_2 C.

In the physical analysis of the land this classification includes the origin of soil, parent materials, the depth of the regolith, the texture and degree of stoniness of the surface soil, the general slope of the land, and internal drainage conditions. The extent of erosion was also mapped where observed. In each of these features of the physical characteristics of the land, symbols were selected to cover all the variations that were recognized in this region. Most of the materials are of outwash or till origin. The depth of regolith and stoniness of the surface soil are two of the most significant controls of land use. Soil textures vary from sand to clay, yet the bulk are silt loams, silty clay loams, or clay loams. Slope was found to be one of the more difficult aspects to map accurately, though slopes are fairly uniform in many sections of the Avalon Peninsula[1].

Five types of drainage conditions were adopted, yet it was found that the intermediate types were mapped most frequently; D_5 type of drainage conditions coincides fairly closely with bogs and, therefore, was used sparingly. No further symbols than Bb were used to describe the areas of barren bog, as most of the other symbols have little significance in such a type area. Similarly, barren rocky areas were mapped as Br with no further designation of physical characteristics being included.

The third part of the classification had to do with the present land use. On photographs of 3,300 feet to 1 inch scale it was found possible to map six categories of woodland, which is the dominant form of land use. These were: Wo burnt over; W_1 the best growth and of commercial value, with trees exceeding 6 inches in diameter; W_2 the smaller dense growth; W_3 scrubby or stunted small growth; W_4 alder, etc.; and Wc cut-over forest land. On larger scale photographs it was found that a finer distinction could be made and W_{10} was introduced to denote scattered stands of large trees, W_{20} scattered stands of smaller trees, and so on.

Five types of barren lands were recognized: Bt, barren but with more than 12 inches till; Bta, where till is less than 12 inches in depth; Br, a barren rocky site not usually capable of supporting a forest; Bb, a bog; and Bo, a burnt-over rocky piece of land. Bk and Bow are included to designate materials of kame or outwash origin that are not supporting any vegetation. A small "g" was added where it was definitely learned that the area was being grazed.

On the small-scale photographs only two types of cropland were mapped: Co, newly cleared land but not cropped as yet, and C for present cropland. Various type crops were plotted on the larger scale photographs. The pasture lands were not differentiated on the 3,300 feet to 1 inch photographs but these categories were employed in the larger scale bases. Urban land was shown by the symbol "U".

The application of the method of land classification described above involved field traverses by automobile and on foot. However, many of the details were completed by a stereoscopic examination of the photographs in the office. It was proved that much of the work could be done quite accurately this way provided the researcher had made previous checks in the field and was generally familiar with the area being studied.

---

[1] For study of slope measurement *See*: Louis A. Wolfanger: Landform Types; Tech. Bull. 175, Michigan State College, East Lansing, Feb. 1941.

THE FRACTIONAL CODE METHOD OF LAND CLASSIFICATION

This system permits the achievement of the greatest possible accuracy in field investigation within certain time and cost limits; it provides a technique that bridges the gap between detailed field analysis and general reconnaissance methods and at the same time has a certain flexibility that allows modifications to be made to meet varying conditions and purposes. This system, which was developed by the Land Classification Section of the Tennessee Valley authority, was adapted and applied to sample areas of the Avalon Peninsula during the summer of 1950[1] (Figure 9). In outline it is this:

Land Classes (General) Expressed by the Numerator

0 — barren lands
1 — forest land
2 — agricultural land
3 — land occupied by villages
4 — urban land

Barren Lands—0 Numerator: in detail

0r — barren — rocky
0o — barren — burnt over
0c — barren — cut over
0b — barren — bog

Forest Land—1 Numerator: in detail

10 — burnt over woodland
11 — best growth — commercial
12 — smaller dense growth
13 — stunted—scrub
1c — cut over
14 — alder, etc.

On photos 800′ equal 1″, 200′ equal 1″
Add.
110 — scattered 11
120 — scattered 12
130 — scattered 13
140 — sparse 14

Agricultural Lands—2 Numerator: in detail

On 3,300′ equal 1″ (unit of mapping equal 200 ac. approx.)
Major land use — pasture — 0
hay — 1
hoe crops — 2
mixed crops — 3

On Photos 800′ equal 1″, 200′ equal 1″
Unit of mapping field by field

Newly cleared land	0
Cropland—hay, timothy, clover, etc.	1
Oats for fodder	2
Potatoes	3
Vegetables (turnip, cabbage, lettuce)	4
Small garden plot	5
Pasture—very rough—non-arable land	6
Never ploughed but arable	7
Pasture in rotation	8
Waste land and idle land	9

---

[1] Land classification in the United States; National Resources Planning Board, Washington, 1941.
Finch, V. C., and Splatt, Robert: Geographic Surveys; The Geographic Society of Chicago Bull. No. 9, 1933.

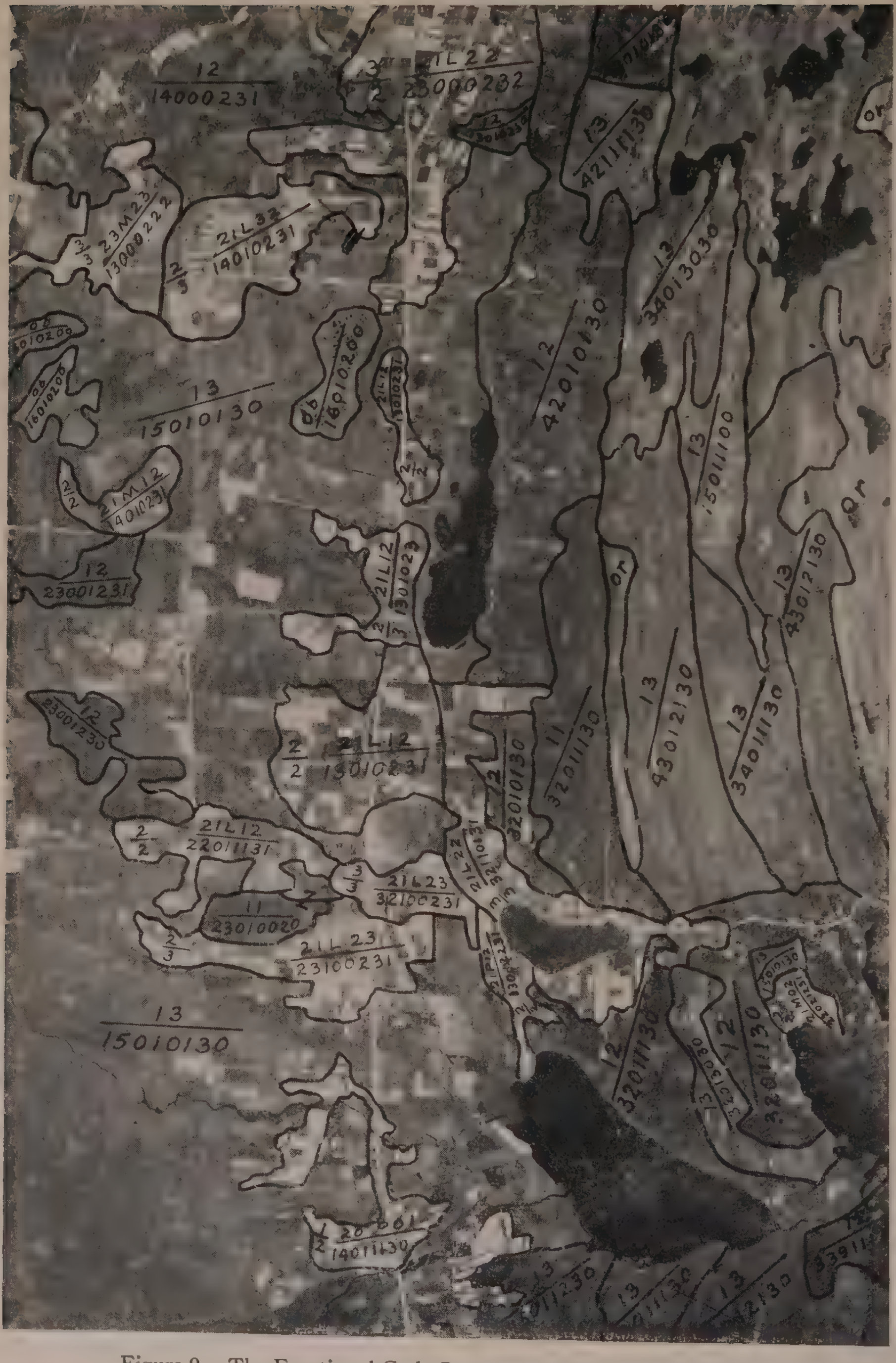

Figure 9. The Fractional Code System applied to the Goulds area.

Type of Farming

Full-time livestock and dairy — L
Full-time mixed farming — M
Full-time hoe crops — H

Subsistence agriculture — S
Part-time agriculture — P

Size of Farm

Less than 5 acres — 0
5–25 acres — 1
More than 25 acres — 2

Quality of Buildings

Poor — 1
Fair — 2
Good — 3

Physical Conditions of the Land: Expressed by the Denominator

(1) *Slope*

0-2 per cent — 1
2-5 " — 2
5-15 " — 3
15-30 " — 4
> 30 " — 5

(2) *Drainage*

Excessive — 1
Good — 2
Moderate — 3
Imperfect — 4
Poor — 5
Bog (glei) — 6

(3) *Erosion*

0 — no evidence of erosion
1 — mild sheet wash
2 — severe sheet erosion

(4) *Stoniness of soil*

0 — few stones
1 — moderately stony
2 — very stony

(5) *Rock exposure*

No evidence — 0
0-25 per cent — 1
25-50 " — 2
> 50 " — 3

(6) *Depth of drift*

< 12″ — 0
1-5′ — 1
> 5′ — 2

(7) *Soil texture*

Glei — 0
Clay — 1
Silty clay — 2
Clay loam — 3
Silty clay loam — 4
Silt loam — 5
Loam — 6
Sandy loam — 7
Sand — 8
Gravel — 9

(8) *Soil fertility*

Very low — 0
Low — 1
Fair — 2
Good — 3

In the Avalon Peninsula, four major types of land were recognized: (0) barren lands; (1) forest land; (2) agricultural land; and (3) land occupied by villages, towns, cities, airports, etc. Several subdivisions were introduced for each category. With regard to agricultural type, subsistence and part-time were the most prevalent forms in this area. Most farms are less than 25 acres in size. Farm houses are generally in good repair, and barns are usually small or entirely lacking. Most of the land can be considered to be of inferior quality, but there were many examples of fair land being inefficiently utilized.

Eight factors were included in the denominator of the long fraction, namely: slope, drainage, erosion, stoniness of soil, rock exposure, depth of drift, soil texture, and soil fertility. Slope and drainage were often found to be closely related. Erosion is nowhere particularly severe. Most soils are moderately to excessively stony. Depth of drift and rock exposure are quite variable factors. With regard to soil texture types, 2, 3, and 4 were most common, and with reference to soil fertility very low and low ratings are general for this area.

The fractional code and land type methods of land classification differ in three important respects.

(1) The fractional code method contains data on the type of farming practised, the quality of the land, the efficiency of land use, and the condition of buildings and size of farm, which are not included in the land type method. In many cases these aspects call for more subjective judgment than those contained in the land type system, and for this reason the reliability of the classification depends to a greater degree on the observer.

(2) In the fractional code system the entire fraction must be written down whenever an observation is recorded because the meaning of each digit is dependent upon its position in the fraction. The land type method is more flexible in that any one symbol may be plotted independently of the others.

(3) The symbols of the fractional code system require more space for plotting, as all must be plotted for any section of land even if only one factor appears to vary.

Figure 10. Waterford Valley—one of the better developed agricultural areas of the Avalon Peninsula.

SUMMARY

The World Land Use Classification has been found to be a valid system that can be applied to large areas in a relatively short period of time and at a reasonable cost provided aerial photographs and suitable personnel are available. It fails, however, to reveal anything directly about the intrinsic nature of the land. The fractional code method was found to be a very useful system, especially because of the information it gives regarding the efficiency of land use, the size of holding, and the type of agricultural development. It permits the achievement of accuracy in field investigation within certain time and cost limits, provides a technique that bridges the gap between detailed field analysis and general reconnaissance methods, and has at the same time a certain flexibility that allows modifications to be made to meet varying conditions and purposes. However, as plotting cannot be accomplished satisfactorily on small-scale maps, it is better adapted to more detailed surveys.

In many respects the land type-land use method is better for reconnaissance and detailed reconnaissance work. Mapping is more convenient and faster, as on many traverses complete data need only be plotted at intervals whereas the variable elements may be jotted down at intermediate points. However, it is, perhaps, too detailed for initial studies of extensive areas. The land type as conceived by Veatch[1] of Michigan or the physiographic divisions mapped by Putnam[2] and Chapman in Ontario seem to be the most suitable taxonomic units for mapping the natural qualities of the land. Field experimentation in the Avalon Peninsula in various methods of mapping the physical characteristics and the use of the land has revealed that much of the work can be completed quite accurately and quickly by a careful examination of the aerial photographs, after researchers have made field checks and have become familiar with the landscape being studied.

RÉSUMÉ

Cet article est une étude critique de trois systèmes différents de classification du sol, appliqués lors d'une enquête faite dans la péninsule d'Avalon (Terre-Neuve). L'article débute par une description des éléments physiques de la région, soit la physiographie, le climat et les sols.

Le premier système utilisé fut celui de l'Inventaire mondial de l'utilisation du sol (World Land Use Classification), tel que proposé en 1949 pour une classification mondiale du sol dans les conditions présentes. On a trouvé que cinq des neuf catégories de ce système s'appliquaient à la région étudiée. La compilation initiale a été faite d'abord sur des photographies aériennes et vérifiée ensuite par des relevés sur le terrain. Un examen critique de chacune des catégories et du système, en général, révèle ses limites, ses avantages et la façon dont on pourrait l'améliorer.

Le système de relevé-type de terres-types de sol (land type-land use) est essentiellement une technique de relevé sur le terrain qui classifie, d'une façon générale, sur la carte, à la fois les aspects physiques du sol et son aménagement actuel. On compile sur des photographies aériennes

---

[1] Veatch: op. cit.

[2] Chapman, L. J., and Putnam, D. F.: The Physiography of Southern Ontario; Toronto, University of Toronto Press, 1951.

au moyen de symboles, la nature du sol, la texture des matériaux, la pente et l'égouttement du terrain et l'utilisation actuelle. Cette méthode suppose de nombreux relevés transversaux, mais on a constaté par expérience que beaucoup de détails pouvaient être compilés à l'avance, par le seul examen stéréoscopique des photographies aériennes.

Enfin le système de classification du sol par l'emploi d'un code de fractions (Fractional Code) est de grande précision et comble une certaine lacune entre la méthode d'analyse détaillée sur le terrain et celle de la reconnaissance générale. Elle indique en détail les types de sol, leur utilisation et les conditions physiques dominantes; de plus elle exprime numériquement, par des fractions, tous ces facteurs. Les principaux types de sol de la péninsule d'Avalon sont ainsi cartographiés avec leurs facteurs physiques et l'on compare ce système avec le précédent.

En guise de conclusion, on souligne les avantages et les inconvénients des trois systèmes utilisés lors de cet inventaire ainsi que les résultats du relevé expérimental sur le terrain.

MAP NOTES

Selected Canadian Maps

Principal Coal, Iron Ore, and Iron and Steel Areas in Relation to the St. Lawrence Seaway.

Canada, Dept. of Mines and Technical Surveys, Mines Branch and Geological Survey of Canada, Ottawa, 1951.

The map covers an area including eastern North America, Central America, and the northernmost part of South America. Coal areas, iron ore deposits, and steel centres are shown, together with the principal shipping routes and distances in nautical miles. Tables give the approximate shipments of iron ore deposits for the areas, by millions of long tons, for the year 1950.

Forestry Maps of Saskatchewan. 1:63,360.

Saskatchewan, Dept. of Natural Resources, Forestry Branch, Regina.

The sheet lines of this recent series correspond to those of the Federal National Topographic Series. The forestry information is compiled and drawn from aerial photographs taken by Aero Surveys Limited. The type of wood, height, and type of forest cover are indicated by symbols and colour tints.

The Southern Part of the Province of Manitoba. 1:506,880.

Manitoba, Dept. of Mines and Natural Resources, Surveys Branch, Winnipeg, 1951.

This latest edition shows boundaries of municipalities and local government districts in colour.

Cereal Variety Zones of Saskatchewan as Determined by Soil and Climate.

Saskatchewan, Dept. of Agriculture, Co-operative Agricultural Extension Programme, Regina, 1952.

The map shows recommended areas for the cultivation of the different varieties of wheat, oats, barley, and flax.

[E.L.B.]

BOOK NOTES

Recent Government Publications of Geographical Interest

Joint Report upon the Survey and Demarcation of the Boundary Between Canada and the United States from Tongass Passage to Mount St. Elias. International Boundary Commission, Dept of Mines and Tech. Surv., Ottawa, 1952. Pp. xiv-365, tbls., maps, illus. Obtainable from the Geodetic Survey of Canada; price $8 in linen cover, $3 in paper cover.

This is another in the invaluable series of International Boundary Commission reports, for quite apart from its quasi-legal aspects it contains much information of use to the researcher. Most of this is in the appendixes, which include an historical sketch of this section of the boundary, the boundary treaties, and explorations and surveys prior to the convention of 1903. Much of the body of the work is taken up with a description of the field operations from 1904 to 1920, which is well illustrated with photographs.

[N.L.N]

PUBLICATIONS OF THE GEOLOGICAL SURVEY OF CANADA (1917–1952). Compiled by Lorne B. Leafloor. Canada, Dept. of Mines and Tech. Surv., Geol. Surv., Canada, Ottawa, 1952. 82 pp. Price 50 cents.

This publication is supplementary to Ferrier's Annotated Catalogue of, and Guide to, the Publications of the Geological Survey of Canada, 1845–1917. It is prepared in two parts, one for geological reports, and the other for geological maps. Part I includes Geological Memoirs, Museum Bulletins, Summary Reports, Economic Geology Series, Geological Survey Bulletins, and Papers. The geological series of the Museum Bulletins are listed to 1946, after which time they were issued as Geological Survey Bulletins. The Summary Reports are listed to 1933, when they were discontinued. Part II lists geological maps in numerical order for each province and for the territories, and gives the geographic co-ordinates for each map-sheet, the type of geological information, and the date of publication.

[B.V.G.]

APPENDIX TO STATUTORY HISTORY OF THE STEAM AND ELECTRIC RAILWAYS OF CANADA, 1836–1937. Compiled by Robert Dorman. Dept. of Transport, Ottawa, no date. 22 pp., 18 maps.

This appendix is divided into two parts. Part one contains additions to the Statutory History of Canadian Railways 1836–1937 by railway companies. This publication, issued in 1938, is a record of all statutes passed as Legislative Acts in Canada affecting the development of railways. The statutes are presented in chronological order for each railway company and these companies are classified alphabetically.

The second part of the appendix is a set of eighteen maps indicating the location of railway lines in Canada, on June 2, 1941. There are three groups of six maps each. The first group locates the railways forming the Canadian National system with their original names, the second group, the Canadian Pacific system, and the third set of maps illustrates the independent railways.

[P.C.]

ADVANCES IN SOIL CONSERVATION IN CANADA. By E. S. Hopkins. Jour. of Soil and Water Cons., Nov. 1952.

The theme of this paper is that "owing to the extremely wide differences in the soil, climate and types of agriculture, quite different soil conservation problems are encountered throughout Canada". This is well illustrated by an outline of the conservation projects conducted by the Federal Government and those conducted by Provincial Governments, and also of agronomic investigations.

[N.L.N.]

HYDROGRAPHIC FEATURES OF THE STRAIT OF BELLE ISLE. By W. B. Bailey and H. B. Hachey (with) PREFACE ON THE OCEANOGRAPHY OF THE STRAIT OF BELLE ISLE. By A. G. Huntsman. Joint Committee on Oceanography, Atlantic Oceanographic Group, St. Andrews, 1951. 52 pp., maps, graphs, mimeo.

This paper describes the distribution of temperature, salinity, and density, with the results plotted on maps and graphs. The double movement of currents through the Strait of Belle Isle is the main subject discussed in the Preface.

[W.A.B.]

THE GENERAL HYDROGRAPHY OF THE WATERS OF THE BAY OF FUNDY. By H. B. Hachey (revised by H. B. Hachey and W. B. Bailey). Joint Committee on Oceanography, Atlantic Oceanographic Group, St. Andrews, 1952. 100 pp., stat., tbls., graphs, maps; mimeo.

This report is a re-issue of Dr. Hachey's original manuscript based on his surveys of 1929 and 1930. The present report stands as a major contribution to the knowledge of the general hydrography of the Bay of Fundy. Distribution of temperature, salinity, and density is described, with the results plotted on map and graphs. Statistical tables are also included.

[W.A.B.]

THE BIRDS OF NEW BRUNSWICK. By W. Austin Squires. The New Brunswick Museum, Mon. ser. No. 4, Saint John, 1952. 164 pp., illus., maps, biblio., index.

This monograph, the third of its kind for New Brunswick, is a catalogue of the birds of the province, prefaced by a short account of the geography and climate. Knowledge of the distribution and relative abundance of many species is still considered to be incomplete but this work should provide a starting point for future field study.

[W.A.B.]

FISHING INDUSTRY OF PRINCE EDWARD ISLAND. By H. Scott Gordon. Canada, Dept. of Fisheries, Markets and Economics Service, Ottawa, 1952. 48 pp., maps, graphs, stat. append.; multilith.

This study is concerned chiefly with the present economic position of the province's fisheries. The first part is concerned with the primary industry—catching the fish. It discusses in detail an historical review of fish landings (1919–1949), the present position of fish landings (1950), the factors of production, and the development potentialities. The second part deals with the processing of fishery products, and their transportation and marketing.

[W.A.B.]

THE QUEBEC-LABRADOR IRON BELT, QUEBEC AND NEWFOUNDLAND. By J. M. Harrison. Canada, Dept. of Mines and Tech. Surv., Geol. Surv., Canada, Paper 52-20, Ottawa, 1952. 21 pp., mimeo., figures.

Le minerai du gisement de fer du Québec-Labrador provient de formations protérozoïques reposant sur des gneiss archéens et il se présente dans des couches fortement plissées et brisées par de nombreuses failles. Ces formations protérozoïques se trouvent sur une lisière large de 60 milles et chevauchant sur la frontière Québec-Labrador, dans la région de Burnt Creek. L'auteur de ce court ouvrage décrit chacune des nombreuses formations géologiques trouvées dans cette lisière ferrifère et, naturellement, insiste dans son dernier chapitre sur les dépôts de minerai et sur les conditions dans lesquelles ils se trouvent.

[P.G.]

GROUND WATER IN ONTARIO 1947. By A. K. Watt. Sixtieth Ann. Rept., Ont. Dept. of Mines, vol. LX, pt. XI, 1951. Pp. vi-116, maps, illus., tbls.

This report is a compilation of ground-water data assembled for reference and study as the first stage in the program of appraisal of existing ground-water resources initiated by the Government of Ontario in 1945. The data were assembled chiefly from observation, well measurements, and drillers records, and are supplemented by information on geology and climate as an aid in the understanding of ground-water behaviour.

[N.L.N.]

AVON VALLEY PLAN. Upper Thames River Conservation Authority, London, Ont., 1952. Pp. 51, illus., maps.

The purpose of this booklet "is to bring to the people on the Avon a few ideas about land use". The Avon, forming part of the Upper Thames basin, is of significance to the authority because by "cherishing the little waters" that replenish the larger streams recurring spring floods and diminished summer flow can be regulated. The publication includes a sample plan for one particular farm as well as two large-scale maps of the Avon Valley (above Stratford) showing the forestry and land use measures required to minimize soil and water losses.

[N.L.N.]

SAUGEEN VALLEY CONSERVATION REPORT. Ontario Dept. of Planning and Development, Toronto, 1952. 361 pp., illus., diag., tbls., maps.

This report is prefaced by forty recommendations regarding preservation of the historical character of the valley, the improvement of land use, especially with regard to erosion and flood control, the conservation and improvement of forest and water resources, and the preservation of wild life.

The first section deals with the history of the valley during the Indian period, with the growth of white settlement in the area, and the decline in population after 1881. The history of the milling industry and agriculture is also discussed.

The second section begins with a non-technical description of the geology, physiography, and soils. The results of the land use survey undertaken for the study are presented, and conservation practices adapted to present land use are suggested. Land use capability as displayed by the proportion of each soil type under cultivation is surveyed and farm sizes and classes are mapped. From these data, agricultural regions within the region are defined, and a survey of recommended land use has been prepared.

The third section deals with forestry. An historical review of forest production in the basin is given, and maps show the location of sawmills and areas recommended as forestry reserves.

The fourth section deals with water resources. The history of the discovery of the rivers is given, and an account of the history of flooding in the area. In 116 years, there have been 36 periods of high water, 18 of which are classed as "severe" or "very severe" floods.

The final section of the report contains the results of a reconnaissance survey of wild life in the area. Maps show trout collections in the summer of 1951, waters posted for private fishing and stream conditions as they affect trout species.

[M.H.M.]

SOIL SURVEY OF HURON COUNTY. By D. W. Hoffman, *et al.* Ontario Soil Surv. Rept. 13. Canada, Dept. of Agr., Expt. Farms Serv. and Ontario Agr. Coll., Guelph, 1952. 101 pp., tbls., illus., maps.

The soils of Huron county have been classified primarily on the basis of the type of parent materials, secondly on texture, and thirdly on drainage. Nineteen soil types, belonging to three Great Soil Groups, have been classified and mapped. For each type, the total area, characteristic terrain, profiles, and associated agricultural problems are discussed. The report is illustrated with 25 tables, 10 sketch maps, 16 photographs, 4 graphs, and a soil map of the county, on two sheets, on a scale of 1 inch to 1 mile.

[M.H.M.]

SOIL SURVEY OF DUNDAS COUNTY. By B. C. Mathews and N. R. Richards. Ontario Soil Surv. Rept. 14. Canada, Dept. of Agr., Expt. Farms Serv. and Ontario Agr. Coll., Guelph, 1952. 106 pp., tbls., illus., map.

Like others in the series, this report is presented in five sections. In this case, the first gives a general description of the area, the second deals with the environmental factors that have affected the formation of soils in Dundas county, the third presents the actual soil classification, the fourth deals with management problems in the use of these soils, and the fifth discusses technical terms used throughout the book. Twenty-nine soil types have been classified and mapped. The report is illustrated by 26 tables, 9 sketch maps, and numerous diagrams, and photographs. There is also a single-sheet soil map of the county on 1 mile to 1 inch scale.

[M.H.M.]

REPORT OF THE ROYAL COMMISSION ON THE SOUTH SASKATCHEWAN RIVER PROJECT, 1952. Queen's Printer, Ottawa, 1952. 423 pp., 5 maps, tbls. Price $2.

This is the report of the Royal Commission appointed in 1951 to conduct an inquiry and to report on the South Saskatchewan River Project (Central Saskatchewan Development).

The report is presented in three parts. Part 1 deals with the Commission's recommendations and considerations. Part 2 outlines the geographical and the historical setting and deals with such relevant topics as irrigation in western Canada, legal and constitutional aspects, costs, benefits, and long-run economics. One chapter is devoted to a detailed description of the Project itself, which includes an outline of the plans for the Qu'Appelle Valley Dam, the Delta Region, and the Red Deer River Project.

The Commission presented three main conclusions: (1) The total cost of the Project would place too great a burden on the land or on the farmer. It is confident that irrigation farms can be created, as they have been in the past, at less cost, elsewhere in the river basin. (2) Smaller projects elsewhere seem likely to afford a more profitable and desirable use of the physical resources, especially irrigation of land that is in the real arid core. (3) A wider, less regional approach to the whole project is needed. They also point out that serious deficiencies exist in the basic date available and that more research must be conducted in the region of true aridity in order to ensure sound planning in both the regional and national interest.

Large-scale maps of the Project area show the general setting, main dam site, irrigable acreage, and soil types. A map appended to a submission on irrigation shows the extent of the "dry bowl", together with present and proposed irrigation areas in Alberta and Saskatchewan.

[M.R.D.]

FARMING IN ALBERTA, CANADA. By R. E. English. Alberta, Dept. of Agriculture, 1952. 40 pp., maps, tbls.

This booklet touches very briefly on many aspects of the agricultural land resources, and their historical and current development in the province of Alberta. Soils, farm type areas, and irrigation districts are mapped and discussed, together with many of the financial, social, and economic aspects of farm operations. Statistical tables provide information on farm production, mechanization, land tenure, investment, farm credit, and Government services.

A number of excellent photographs provide a pictorial review and round out the account of farming in Alberta.

[M.R.D.]

THE SOILS ON THE KANANASKIS FOREST EXPERIMENT STATION IN THE SUB-ALPINE FOREST REGION IN ALBERTA. By D. I. Crossley. Canada, Dept. of Res. and Dev., Forestry Br., Silvicultural Res. Note No. 100, Ottawa, Queen's Printer, 1952. 32 pp., 3 maps, tbls., figures, photographs.

This is the first detailed forest soil survey made in the Canadian Rockies. Although the soils of the mountains are complex and there are very few published data, an attempt has been made to devise a form of study, the results of which can be correlated by the forester with other pertinent information. Forest protection, drainage, natural regeneration, and planting are considered, with descriptions of each soil type and general notes on depth, erosion, and productivity.

[B.C.]

TRANSACTIONS OF THE FIFTH BRITISH COLUMBIA NATURAL RESOURCES CONFERENCE. British Columbia Natural Resources Conference, Victoria, 1952. 356 pp., maps, tbls.

This is the fifth in a series of reports (*See* Geog. Bull. Nos. 1 and 3) that form an excellent source of up-to-date information on the resources of British Columbia. The theme of the fifth Resources Conference was the national and international significance of the resources of the western province.

Its transactions consist of papers presented by panels representing the various natural resources, the emphasis being placed on the national and international importance of the particular resource, whether it be forestry, agriculture, wild life, mining, fish, or power. Some of these papers are of special interest to geographers. J. D. Chapman, Assistant Professor of Geography at the University of British Columbia, presented an analysis of the climate of the province in which he discussed the factors that affect the climate and the various climatic types that are to be found. The article includes a map of climatic regions and is well documented with the latest statistics for representative British Columbia stations as well as a comprehensive bibliography.

A representative of the Aluminum Company of Canada contributed a paper on the new development in the Nechako-Kitimat area. Stress was placed on the new towns and subsidiary industries that may result in central British Columbia and the effect of the increased output of aluminium on world markets was also discussed. Another paper considered the effects of the oil pipe-line that is to link Edmonton and Vancouver and the new industries and markets that it will open up.

[R.H.D.]

THE DOUKHOBORS OF BRITISH COLUMBIA. By Harry Hawthorn, ed. Rept. of the Doukhobor Res. Comm., Univ. of British Columbia, 1952. 342 pp.

In the spring of 1950 the University of British Columbia was asked to appoint a group of experts to make a study of the Doukhobors. The purpose of the study was to gain a better understanding of the motives and drives of the Doukhobors through an increased knowledge of their cultural background and economic history. The findings of the study are presented in this report, which includes recommendations by each expert and considers the possibility and desirability of relocation of some of the Doukhobors. In relation to the latter aspect, a study of the character of the Kootenays, where the Doukhobors are presently located, was undertaken by a soil specialist and the problem of settlement in a similar area or in the pioneer sections of British Columbia is discussed.

[R.H.D.]

A NATURAL HISTORY OF THE MANNING PARK AREA, BRITISH COLUMBIA. By G. Clifford Earl, C. J. Guiguet, and George A. Hardy. British Columbia, Occasional Papers of the British Columbia Provincial Museum Number 9, Victoria, 1952. 130 pp., map, illus.

The Manning area is of particular interest as it is both topographically and climatically transitional between the wet forests of the Coast and Cascade Mountains and the dry vegetation of the Interior Plateau. The topography and climate of the area are briefly summarized, the major part of the report consisting of lists of the fauna and flora that have been observed.

[R.H.D.]

CLAY AND SHALE DEPOSITS OF BRITISH COLUMBIA. By J. M. Cummings and J. W. McCammon. British Columbia, Dept. of Mines, Bull. 30, Victoria, 1952. 64 pp., maps, tbls.

This report is concerned with the character of the clay and shale deposits of British Columbia. Of most interest to the geographer is the introductory chapter in which is outlined the economics of the distribution of the deposits, the history of clay working, and the present state of the clay products industry.

[R.H.D.]

PEACE RIVER-SOUTH, LAND UTILIZATION SURVEY, 1948–51. By J. D. Chapman and J. S. Gilmore. British Columbia, Dept. of Lands and Forests, Div. of Land Utilization Research and Survey, Victoria, B.C., 1952. 49 pp., maps, tbls., illus.

This publication presents the results of four seasons of field study into the land use and further settlement possibilities of the southern part of the Peace River district of British Columbia. It discusses the history of settlement, geology, physical features, water supply, climate, soils, cover, communications and transportation, amenities, resources, agriculture, and settlement possibilities.

The section on agriculture deals with present land use, erosion and fertility problems, and crop recommendations. Settlement possibilities on the remaining unclaimed land are seen as being quite limited as only a small acreage of first class agricultural land remains unalienated. The total area of Crown Land is broken down into eight land use capability classes.

In an appendix the field work methods are described, and a detailed description of the capability classes is given. Tables summarize the distribution of land class acreages throughout the area, as well as the present land use acreages. Average commodity rates for shipping produce from the district are given as general information useful to residents and incoming settlers.

Two maps on a scale of 1 inch to 2½ miles accompany the publication. One shows present land use and cover, the other indicates land use capability.

[L.L.P.]

NOTES ON THE BIRDS OF SOME JAMES BAY ISLANDS. By T. H. Manning and D. F. Coates. Ann. Rept. of the Nat. Museum of Canada for the Fiscal Year 1950–51, Bull. No. 126, Ottawa, 1952. Pp. 195-205, map.

From visits made in 1947 and 1950 to eleven of the smaller "barren or near-barren islands of central James Bay", a systematic list of 30 species of birds has been compiled. A short summary of the ornithological investigations of these islands and descriptions of the islands visited precedes the list of species. A map of James Bay gives the location of the islands.

[J.K.F.]

COMPTES RENDUS DU CONGRÈS INTERNATIONAL DE GÉOGRAPHIE, LISBONNE 1949. Union Géographique Internationale, Lisbonne, 1951, Tome III, Travaux de la Section IV. 559 pp., cartes, photographies.

Plus de soixante communications sont publiées dans ce troisième tome des comptes rendus, relatives à une dizaine de questions de géographie humaine et économique. Les questions inscrites au programme traitaient des sujets suivants: les types et les formes de la vie pastorale, spécialement dans les pays agricoles, les types d'habitations rurales, la pêche maritime et ses conditions géographiques, ses procédés traditionnels et modernes et le genre de vie des pêcheurs, les transformations apportées dans les cultures, le rendement et l'habitat par l'irrigation et par la division des grandes exploitations agraires, la dégradation des sols causée par le défrichement, la culture et l'élevage extensif, l'étude du peuplement et ses problèmes, les problèmes de géographie agraire et l'étude des ports industriels.

Parmi les communications, on remarque un travail de M. B. Brouillette sur les sources de l'étude du peuplement au Canada et en particulier dans la province de Québec, travail d'orientation bibliographique.

[P.C.]

Geographical Bulletin No 5
1954

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1954